

TECHNICAL MANUAL

AVIATION-CREW SYSTEMS

**INFLATABLE SURVIVAL
EQUIPMENT
(LIFERAFTS)**

N68936-04-D-0008

This change incorporates IRAC 16.

**This manual includes Basic, dated 1 October 1995, thru
Change 11, dated 1 August 2004.**

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**1 OCTOBER 1995
CHANGE 11 - 1 AUGUST 2004**

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original	1 Oct 1995	Change 4	1 Dec 1999	Change 9	1 Jun 2003
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Change 3	1 Sep 1999	Change 8	1 Sep 2002		
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Major changes resulting from this change are as follows:

1. Incorporation of IRAC 16 (To update application paragraphs and delete tables for multi-place liferafts LRU-12/A, LRU-13/A, LRU-14/A, LRU-14A/A, LRU-15/A, LRU-30/A, LRU-31/A, LRU-32/A, LRU-30A/A, LRU-31A/A, LRU-32A/A, LRU-33A/A.)
2. Incorporation of Chapter 15, LRU-34/A (MPLR) V-22 Liferaft System.

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A Change 11

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CHAPTER 1

INTRODUCTION

1-1. GENERAL.

WARNING

Unauthorized modification to, and deviations from prescribed life support and survival equipment by individual aircrew-member could create unknown safety hazards. The OPNAVINST 3710.7 Series specifies minimum requirements for such equipment and is supplemented by the individual model NATOPS.

1-2. OPNAVINST 4790.2 Series identifies NAVAIR-SYSCOM as the only authority for modifications to life support and survival equipment, which is usually accomplished by the Fleet Support Team (FST) (formerly Cognizant Field Activity (CFA)) via Aircrew Systems Changes or a change to the equipment procurement package. This manual also permits an operating activity with approval of the controlling custodian, to conditionally modify ONE UNIT of equipment in-service to correct or overcome unsatisfactory conditions in that equipment item. Any other type of deviation/peculiar configuration or modification to life support and survival equipment is disallowed, and the Aircrew Survival Equipmentman has no authority or responsibility to perform them.

1-3. If an omission or conflict should occur between FST documents and NATOPS requirements, or if there is a need for clarification of equipment configuration or if equipment deficiencies are discovered, the applicable FST should be notified. If maintenance deficiencies are discovered, they shall be reported to area type commander in accordance with OPNAVINST 4790.2 Series. The FST for most of the life support and survival equipment is Commander, Naval Air Warfare Center Aircraft Division (NAWCAD), Attn: Code 4.6.1.2, Bldg 2187, Patuxent River, MD 20670-1906. For parachutes and related hardware, including torso harnesses, the FST is the Naval Air Warfare Center Weapons Division, Code 463000D, China Lake, CA 93555. NAWCAD DET Indianapolis, IN 46219 has cognizance over all survival radios and emergency beacons. NSWC, Indian Head, MD is FST for the FLU-8B/P Automatic Inflation Device.

1-4. The Aviation-Crew Systems manual is released under the authority of the Naval Air Systems Command in compliance with the request of the Chief of Naval Operations. The instructions contained herein are mandatory. This manual consists of separately bound volumes, as listed below:

TITLE	PUBLICATION NUMBER
Inflatable Survival Equipment (Liferafts)	NAVAIR 13-1-6.1-1
Inflatable Survival Equipment (Life Preservers)	NAVAIR 13-1-6.1-2
Parachutes	NAVAIR 13-1-6.2
Seat Survival Kits (Oxygen Hoses and Non-SKU Seat Kits)	NAVAIR 13-1-6.3-1
Seat Survival Kits (SKU Series Seat Kits)	NAVAIR 13-1-6.3-2
Oxygen Equipment (Aircraft Equipment, Masks, and Other Systems)	NAVAIR 13-1-6.4-1
Oxygen Equipment (Regulators)	NAVAIR 13-1-6.4-2
Oxygen Equipment (Concentrators)	NAVAIR 13-1-6.4-3
Oxygen Equipment (Converters)	NAVAIR 13-1-6.4-4
Rescue and Survival Equipment	NAVAIR 13-1-6.5
Aircrew Personal Protective Equipment (Aircrew/Passenger Equipment)	NAVAIR 13-1-6.7-1
Aircrew Personal Protective Equipment (Clothing)	NAVAIR 13-1-6.7-2
Aircrew Personal Protective Equipment (Helmets and Masks)	NAVAIR 13-1-6.7-3
Aircrew Personal Protective Equipment (Protective Assembly, Aircrew Survival - Armor)	NAVAIR 13-1-6.7-4
Special Missions Aircrew Equipment	NAVAIR 13-1-6.10

NAVAIR 13-1-6.1-1

1-5. The purpose of each volume is to provide technical information related to the function, inspection and repair of a particular category of aircrew safety and survival equipment. The information contained in each volume is intended for organizational, intermediate and depot levels of maintenance as established within the Naval Aviation Maintenance Program (OPNAVINST 4790.2 Series).

1-6. DESCRIPTION OF NAVAIR 13-1-6.1-1.

1-7. CONTENTS. This volume contains information on configuration, functions, application, inspection, repair and packing of liferaft inflatable survival equipment. Packing and folding of LR-1 and LRU-23/P liferafts used in Seat Survival Kits are covered in NAVAIR 13-1-6.3-1 and NAVAIR 13-1-6.3-2.

1-8. CONFLICTS AND SUPERSEDURES. This volume shall take precedence over all other documents except for effective related Aircrew System Changes, Interim Aircrew System Changes and Aircrew System Bulletins. This document is effective until officially rescinded, canceled or superseded.

1-9. The modifications section of each chapter lists all effective changes and bulletins which affect inflatable survival equipment and have been issued on or before the date of latest change or revision. When applicable, the subject matter of these documents has been incorporated within the text of the appropriate chapters.

1-10. Effective changes and bulletins which affect inflatable equipment and are issued between changes and revisions to this volume should be recorded in the modification section of the manual for the affected equipment by annotating the outer margin of the page with a vertical line and the number of the change or bulletin. A copy of the change or bulletin should be filed in a separate binder in the ALSS work center. When this volume is updated these documents will be listed in the modification sections of the applicable chapters and the text of the chapters will be updated to reflect the changes and bulletins.

1-11. Appendix A is reserved. Appendix B lists metric system and metric unit conversion charts. Appendix C lists supplies, materials or equipment used in the volume which is not listed in the IPBs.

1-12. UPDATING. This volume will be updated periodically by the issuance of a Revision, which is a 100-percent

replacement of pages. Between revisions, changes and rapid action changes will be released, which are partial replacements of pages. All added and changed pages shall be incorporated according to page number. Superseded and deleted pages shall be discarded in accordance with local security procedures for data containing distribution statements. A List of Effective Pages is provided with each change. The List of Effective Pages will show the most current change or rapid action change. A summary of the major changed areas for a particular change is located directly beneath the List of Effective Pages.

1-13. TECHNICAL PUBLICATION DEFICIENCY REPORT. Technical publication deficiencies shall be submitted in accordance with OPNAVINST 4790.2 Series.

1-14. ENGINEERING DRAWINGS. Government engineering drawings are available to the fleet by submitting a letter of request to Commanding Officer, Naval Air Technical Data and Engineering Service Command, Naval Air Station North Island, P.O. Box 357031, Building 90 Distribution, San Diego, CA 92135-7031. Each request should include the equipment nomenclature, part number, and CAGE code. The drawings will be provided in the form of aperture cards (Automatic Data Processing Punch Cards). Technical data may also be obtained online at the NATEC website located at <http://www.natec.navy.mil>. Authorized users must first establish an account prior to obtaining data. Access/account information can be obtained at the NATEC website.

1-15. TECHNICAL DIRECTIVES AND FORMS. NATEC is the central management activity for aeronautical technical publications, engineering drawings and associated technical services. Upon release, NATEC will forward to all designated activities, copies of Technical Directives and Forms. Additional copies are available utilizing the procedures shown in [paragraph 1-14](#) as well as from the PMA-202 website at <https://pma202.navair.navy.mil>.

1-16. QUALITY ASSURANCE. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Collateral Duty Inspection (CDI-CDQAR-QAR) as established within the Naval Aviation Maintenance Program (OPNAVINST 4790.2 Series) prior to proceeding to the next operation. In no case shall an Aircrew Survival Equipmentman perform his/her own quality assurance inspection.

1-17. SUPPLEMENTARY PUBLICATIONS.

1-18. The following publications supplement this volume:

1. NAVAIR 00-35QH-2 Allowance List. Aviation Life Support System and Airborne Operation Equipment for Aircraft Squadrons Navy and Marine Corps.

2. OPNAV INSTRUCTION 4790.2 Series. The Naval Aviation Maintenance Program.

3. List of Naval Aviation Life Preserver and Liferaft Equipment E0088.

4. OPNAVINST 4410.2A.

5. OPNAV INSTRUCTION 3710.7 provides general instructions on required minimums for aircrew personal protective equipment.

6. NATOPS MANUALS provide instructions on required inflatable survival equipment.

7. Naval Logistics Library (NAVSUP 600).

8. Code of Federal Regulations 49 CFR 71 90 provides information on hydrostatic testing of multiple liferaft CO₂ cylinders.

9. NAVAIR 13-1-6-8 Aviation Crew Systems Work Unit Code Manual.

10. NAVAIR 01-1A-509 Cleaning and Corrosion Organizational and Intermediate Maintenance.

11. NAVAIR 11-100-1.1 General Use Cartridges and Cartridge Actuated Devices for Aircraft and Unique Aircraft Systems (CADS).

12. NAVSUPINST 4440.128B.

13. NAVSUPINST 4423.29 (Series). Naval Material Command (NMC) Uniform Source, Maintenance and Recoverability (SM&R) Codes.

14. NAVSUP P-719 is a Guide for the Assignment and Use of Source, Maintenance and Recoverability (SM&R) Codes.

1-19. DEFINITIONS.

1-20. The following is a list of definitions used in this volume:

WARNING

Indicates danger to personnel. The warning precedes the item to which it refers.

CAUTION

Indicates danger to the equipment. The caution precedes the item to which it refers.

NOTE

An information item. The note may precede or follow the item to which it refers.

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CHAPTER 2

MAINTENANCE CONCEPTS, SCHEDULING AND DOCUMENTATION

Section 2-1. Maintenance Concepts

2-1. GENERAL.

2-2. NAVAL AVIATION MAINTENANCE PROGRAM. All maintenance and inspection actions upon Aviation Life Support Systems (ALSS) equipment shall be made as part of the Naval Aviation Maintenance Program in accordance with OPNAVINST 4790.2 Series.

2-3. LEVELS OF MAINTENANCE. Maintenance of ALSS equipment shall be performed at the established level of maintenance in accordance with OPNAVINST 4790.2 Series.

2-4. QUALIFIED PERSONNEL. Refer to OPNAVINST 4790.2 Series for qualifications of personnel authorized to perform maintenance actions on ALSS equipment.

Section 2-2. Maintenance Scheduling

2-5. GENERAL.

2-6. INSPECTION CYCLES. Scheduled maintenance requirements for aircraft and man-mounted equipment are published in the applicable aircraft maintenance requirement cards and this manual.

NOTE

To meet unusual situations and facilitate workload scheduling, refer to OPNAVINST 4790.2 Series for authorized deviations to scheduled phase inspection intervals.

Section 2-2A. Accident Evaluation

2-6A. AIRCRAFT ACCIDENT REPORT INSPECTION.

2-6B. Any Aviation Life Support System Equipment along with related subassemblies or equipment which have been recovered following use in an emergency ditching/bailout or ejection (refer to NAVAIR 13-1-6.2 for personnel and drogue parachutes) will be returned to the nearest Naval Supply Activity for shipment via traceable means to: Code 4.6.3.3, Naval Air Warfare Center Aircraft Division, Bldg 2187, 48110 Shaw Rd., Unit 5, Patuxent River, MD 20670-1906.

NOTE

Under no circumstances will any piece of Aviation Life Support System equipment which has been subjected to ditching/bailout or ejection be returned to service.

2-6C. Stencil outside of container in 1-in. letters as follows: THIS EQUIPMENT HAS BEEN USED IN AN EMERGENCY. These items of equipment are required for evaluation and determination of design deficiency and to establish requirements for product improvement.

Section 2-3. Maintenance Documents

2-7. GENERAL.

2-8. DOCUMENTING MAINTENANCE ACTIONS. Upon completion of any maintenance action (e.g., inspections, repairs, modifications), appropriate entries shall be made on applicable maintenance records, in accordance with OPNAVINST 4790.2 Series. The entries by the Aircrew Survival Equipmentman shall provide a systematic record of equipment history

and the documentation of all maintenance actions performed on the equipment.

2-9. MAINTENANCE DOCUMENTS. Refer to OPNAVINST 4790.2 Series for documents used to record history or to document maintenance actions or for additional information for completion of maintenance records. These records are designed to provide continuous configuration and inspection records throughout the service life of ALSS assemblies and their components.

Section 2-4. Illustrated Parts Breakdown Information

2-10. GENERAL.

2-11. This section explains the Illustrated Parts Breakdown (IPB) for ALSS equipment. The IPB can be found at the end of each chapter where applicable. The IPB should be used during maintenance when requisitioning and identifying parts.

2-12. SYMBOLS AND ABBREVIATIONS. Symbols and abbreviations used in the Illustrated Parts Breakdown are as follows:

Symbol	Definition
---*---	Closure (end) of attaching parts
#	Selected part, only one used
x	By (used in dimensions 12“ x 6”)
&	And
Abbreviation	Definition
AR or A/R	As Required
CAGE	Commercial and Government Entity
COML	Commercially available
FIG, Fig	Figure
GAPL	Group Assembly Parts List
GFE	Government Furnished Equipment
IPB	Illustrated Parts Breakdown
L.H.	Left Hand
MAINT	Maintenance
NHA	Next Higher Assembly
No.	Number
RECOVER, RECY	Recoverability
REF	Reference
R.H.	Right Hand
SM&R	Source, Maintenance and Recoverability
Spec. Cont.	
Dwg. or SCD	Specification Control Drawing

2-13. GROUP ASSEMBLY PARTS LIST.

2-14. The Group Assembly Parts List (GAPL) contains illustrations and parts lists for each major assembly. These illustrations and accompanying lists show how the major assemblies are disassembled into subassemblies and detail parts. Each item illustrated is indexed for identification purposes. Each illustration is accompanied by a parts list providing a part

number, description, and quantity for each item. The list is arranged in disassembly order. Through the use of a system of indentation, the relationship of the detail parts to the subassemblies and the relationship of the subassemblies to the main assembly, is shown.

2-15. FIGURE AND INDEX NUMBER COLUMN.

The figure and index number of each item shown on the corresponding illustration appears in the Figure and Index Number Column, with the exception of assemblies and subassemblies which are not illustrated in assembled form. In these cases, the assemblies or subassemblies are listed but not indexed. The component parts thereof are both listed and indexed.

2-16. PART NUMBER COLUMN.

This column contains the contractor’s drawing number, government standard number, vendor drawing number or identifies the part as being commercial hardware (COML). Government standard parts are listed using the applicable MS, AN, AF, NAS, MIL, or JAN part number. Where the part number is controlled by a military specification, this specification number is listed in the Description Column.

2-17. DESCRIPTION COLUMN.

This column lists the item name plus those modifiers necessary to identify the item. The description of a vendor-supplied item includes a five-digit number which identifies the manufacturer. This is the Commercial and Government Entity (CAGE) code. To correlate this CAGE code to the manufacturer’s name, refer to the cataloging handbook H4/H8. CAGE codes may be omitted for prime manufacturer’s parts and for government standard parts. When applicable, contractor’s control drawing numbers and reference designations of electronic parts are also listed for general reference. When a separate exploded view is used to show the detail parts of an assembly or subassembly the Description Column contains an appropriate figure cross-reference in parenthesis following the description. This cross-reference appears both in the listing where the assembly is first described, and in the listing which the assembly is broken down. In the latter case, the abbreviation REF will appear in the Units Per Assembly column. Commercial hardware items (COML) are fully described so that they may be procured from normal commercial sources. Parts stocked in kits are identified with kit component code in this column, i.e., KD.

2-18. Indentation. The indentations headed “1” through “7” in the Description Column are provided to show the relationship of assemblies and their detail parts. The detail parts are indented one space to the right and listed below the assembly to which they belong. Determine the next higher assembly (NHA) of any detail part by locating, in the next space to the left (excluding attaching parts) the first item above the detailed part.

1 2 3 4 5 6 7

ARTICLE (or MAIN ASSEMBLY)

. Detailed parts for ARTICLE (or MAIN ASSEMBLY)

. ASSEMBLY

(ATTACHING PARTS)

. ATTACHING PARTS FOR ASSEMBLY

---*---

. . Detailed parts for ASSEMBLY

. . SUBASSEMBLY

(ATTACHING PARTS)

. . ATTACHING PARTS FOR SUBASSEMBLY

---*---

. . . Detailed parts for SUBASSEMBLY

. . . SUB-SUBASSEMBLY

(ATTACHING PARTS)

. . . ATTACHING PARTS FOR SUB-SUBASSEMBLY

---*---

. . . . Detailed parts for SUB-SUBASSEMBLY

2-19. Attaching Parts. Attaching parts are items used to attach parts or assemblies to each other and follow immediately after the part to be attached. The attaching parts have the same indentation as the part attached. The caption “(ATTACHING PARTS)” is placed on the line immediately above the listing of attaching parts. The separation symbol ---*--- appears on the line immediately under the last attaching part. Quantities of attaching parts are listed per unit. For example, if two fittings are required for each assembly and one bolt is required to attach each fitting, the correct listing would be:

. FITTING ASSEMBLY, Hinge 2
(ATTACHING PARTS)

. BOLT 1
---*---

2-20. UNITS PER ASSEMBLY COLUMN. This column shows the quantity of an item required in the next higher assembly. The abbreviation AR indicates when the quantity is “As Required”.

2-21. USABLE ON CODE COLUMN. Usable on codes are used to indicate part usage where various models and serial numbers of the equipment or similar parts within the equipment use different parts. A

code is assigned to each variation of the equipment and entered into the GAPL when a part is used only in a specified variation. Where no code is entered, the part is used on all units covered by the GAPL or when no variations from the original equipment exist.

2-22. NUMERICAL INDEX.

2-23. The numerical index which follows each GAPL contains all the part numbers listed in that GAPL, arranged in alphabetical-numerical sequence.

2-24. PART NUMBER COLUMN. This column contains the part numbers of the parts and assemblies. Part number arrangement starts at the extreme left-hand position and continues left to right, one position at a time, according to the following order or precedence:

Space	(blank column)
Diagonal	(Slant)
Point	(period)
Dash	(hyphen)
Letters	A through Z
Numerals	0 through 9

NOTE

Spaces, diagonals, points, and dashes do not appear in the extreme left-hand position of the part numbers. However, they may be used in the second and succeeding positions and take precedence over letters and numbers as indicated above.

2-25. FIGURE AND INDEX NUMBER COLUMN.

In this column, the digits preceding the dash refer to the figure in which the parts are illustrated. The digits following the dash are the index numbers.

2-26. SOURCE, MAINTENANCE AND RECOVERABILITY (SM&R) CODE COLUMN. The five digit SM&R codes, assigned by Naval Air Systems Command Representatives are reflected in the SM&R code column. The code format is composed of three parts consisting of a two-position Source Code, a two-position Maintenance Code and a one-position Recoverability Code. See [Table P-1](#) for basic information.

NOTE

For more complete information on Uniform SM&R Codes, refer to NAVSUPINST 4423.29, OPNAVINST 4410.2A, and NAVSUP P-719.

Table 2-1. Source, Maintenance, and Recoverability (SM&R) Code Definitions

SOURCE			MAINTENANCE			
1st POS	2nd POSITION		3rd POSITION		4th POSITION	
MEANS OF ACQUIRING SUPPORT			USE: LOWEST LEVEL AUTHORIZED TO REMOVE/ REPLACE THE ITEM.		REPAIR: LOWEST LEVEL WITH CAPABILITY AND RESOURCES TO PERFORM COMPLETE REPAIR ACTION.	
P	A	ITEM: STOCKED	O	ORG/UNIT	O	ORG/UNIT
	B	ITEM: STOCKED, INSURANCE				
	C	ITEM: STOCKED, DETERIORATIVE				
	D	ITEM: SUPPORT, INITIAL ISSUE OF OUTFITTING & STOCK ONLY FOR ADDITIONAL INITIAL ISSUE				
	E	EQUIPMENT: SUPPORT, STOCKED FOR INITIAL ISSUE OR OUTFITTING OF SPECIFIED MAINTENANCE ACTIVITIES	2 3 4 5 6	MINESWEEPER SUBMARINES AUX/AMPHIB DESTROYER, FFG CRUISER/CARRIER	2 3 4 5 6	MINESWEEPER SUBMARINES AUX/AMPHIB DESTROYER, FFG CRUISER/CARRIER
	F	EQUIPMENT: SUPPORT, NONSTOCKED, CENTRALLY PROCURED ON DEMAND	F	I/AFLOAT	F	I/AFLOAT
	G	ITEM: STOCKED FOR SUSTAINED SUPPORT. UNECONOMICAL TO PRODUCE AT A LATER TIME				
	H	ITEM: STOCKED, CONTAINS HAZMAT. HMIS/MSDS REPORTING REQUIRED				
	R	TERMINAL OR OBSOLETE, REPLACED	G	ASHORE AND AFLOAT	G	ASHORE AND AFLOAT
	Z	TERMINAL OR OBSOLETE, NOT REPLACED				
K	D	ITEM: DEPOT O/H & MAINTENANCE KITS	H	I/ASHORE	H	I/ASHORE
	F	ITEM: MAINTENANCE KIT, PLACE AT O, F, H, L				
	B	ITEM: IN BOTH DEPOT REPAIR AND MAINT. KITS				
M	O	MFR OR FAB AT UNIT LEVEL	K	CONTRACTOR FACILITY	K	CONTRACTOR FACILITY
	F	MFR OR FAB AT INTERMEDIATE/DS LEVEL				
	H	MFR OR FAB AT INTERMEDIATE/GS LEVEL				
	L	MFR OR FAB AT SPECIALIZED REPAIR ACTIVITY (SRA)				
	G	MFR OR FAB AT ASSEMBLED AFLOAT OR ASHORE				
	D	MFR OR FAB AT DEPOT MAINTENANCE LEVEL				
A	O	ITEM: ASSEMBLED AT ORG/UNIT	L	INTERMEDIATE SRA	L	INTERMEDIATE SRA
	F	ITEM: ASSEMBLED AT INTERMEDIATE LEVEL - AFLOAT				
	H	ITEM: ASSEMBLED AT INTERMEDIATE LEVEL - ASHORE	D	DEPOT	D	DEPOT
	L	ITEM: ASSEMBLED AT SRA				
	G	ITEM: ASSEMBLED AFLOAT OR ASHORE				
	D	ITEM: ASSEMBLED AT DEPOT MAINTENANCE LEVEL				
X	A	ITEM: REQUISITION NEXT HIGHER ASSEMBLY	Z	REF ONLY	Z	NON-REPAIRABLE
	B	ITEM: NOT PROCURED OR STOCKED, AVAILABLE THRU SALVAGE, REQ. BY CAGE/PART NUMBER			B	RECONDITION
	C	INSTALLATION DRAWING, DIAGRAM, INSTRUCTION SHEET, IDENTIFY BY CAGE/PART NUMBER				
	D	NON-STOCKED, OBTAIN VIA LOCAL PURCHASE				

RECOVERABILITY		SERVICE OPTION CODE	
5th POSITION		6th POSITION	
DISPOSITION: WHEN UNSERVICEABLE OR UNECONOMICALLY REPAIRABLE, CONDEMN OR DISPOSE.		ASSIGNED TO SUPPORT ITEMS TO CONVEY SPECIFIC INFORMATION TO THE SERVICE'S LOGISTICS COMMUNITY/OPERATING FORCES.	
O	ORG/UNIT	1	I-LEVEL 1ST DEGREE
F	I/AFLOAT	2	I-LEVEL 2ND DEGREE
G	ASHORE AND AFLOAT	3	I-LEVEL 3RD DEGREE
H	I/ASHORE	6	COMMERCIAL ITEM, ORGANICALLY MFR'D
K	DLR; CONTRACTOR FACILITY	8	NON-CONSUMABLE; 2ND DEGREE ENGINE I-LEVEL
		9	NON-CONSUMABLE; 3RD DEGREE ENGINE I-LEVEL
L	INTERMEDIATE SRA LEVEL	E	END TO END TEST
		J	INTER-SERVICE DLR REPAIRABLE BELOW D-LEVEL
D	DLR; CONDEMN OR DISPOSE AT DEPOT	P	PROGRESSIVE MAINTENANCE
Z	NON-REPAIRABLE	R	GOLD DISC REPAIR
A	NON-REPAIRABLE BUT REQUIRES SPECIAL HANDLING	T	TRAINING DEVICES

CHAPTER 3

LIFERAFT SPECIAL TOOLS AND SUPPORT EQUIPMENT

Section 3-1. Description

3-1. GENERAL.

3-2. This chapter lists special support equipment required for the testing and inspection of liferafts. An

assembly and parts breakdown is included with each item of support equipment. See [Section 3-3](#).

Section 3-2. Liferaft Support Equipment

3-3. LEAK TEST FIXTURE.

3-4. A leak test fixture may be fabricated to meet the requirements of the schematic shown in [figure 3-1](#). A suggested leak test fixture, consisting of three-way valve, pressure gage, and adapters for connection to a source of low-pressure air and to the liferaft, is shown in [figure 3-3](#).

NOTE

If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

CAUTION

If three-way valve is not used, measuring device valve must be closed when air feed valve is open.

Damage may occur to oral inflation valve if air supply pressure entering the liferaft exceeds ten (10) psi during leak tests.

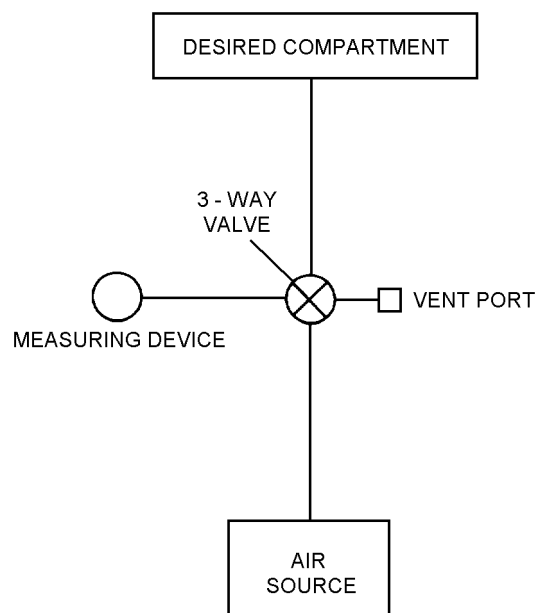


Figure 3-1. Leak Test Fixture Schematic

10030001

3-4A. TEMPERATURE AND BAROMETRIC PRESSURE GAGES.

3-4B. The temperature and barometric pressure must be recorded when performing leakage tests on life-rafts. Should existing gages need to be replaced the equipment listed below is authorized for use. Calibration of this equipment is not required.

1. Certified thermo-hygrometer (P/N 5033) provides temperature and relative humidity, wall mounted.

2. Marine barometer (P/N M111) provides barometric pressure, wall mounted.

3. Outdoor weather computer, hand held, digital display provides temperature and barometric pressure. Pressure provided in bar graph trends for 12 hours and pressure history for 24 hours in 2 hour increments. Calendar/clock functions are included.

4. Above items must be ordered open purchase from:

American Weather Enterprises
P.O. Box 14381
San Francisco, CA 94114
Phone (800)293-2555.

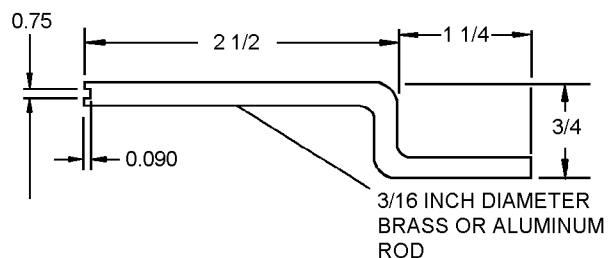
3-5. PNEUMATIC INFLATOR VALVE (CHECK VALVE) CORE TOOL.

3-6. A pneumatic inflator valve (check valve) core tool, part number 8769A or equivalent (CAGE 27783), can also be fabricated as described here. See [figure 3-2](#).

1. Use 3/16 inch solid brass or aluminum rod, approximately 5 inches long.

2. Fabricate as shown in [figure 3-2](#).

3. There is no IPB or Numerical Index for this tool.



NOTES: DIMENSIONS ARE IN INCHES

10030002

Figure 3-2. Core Tool

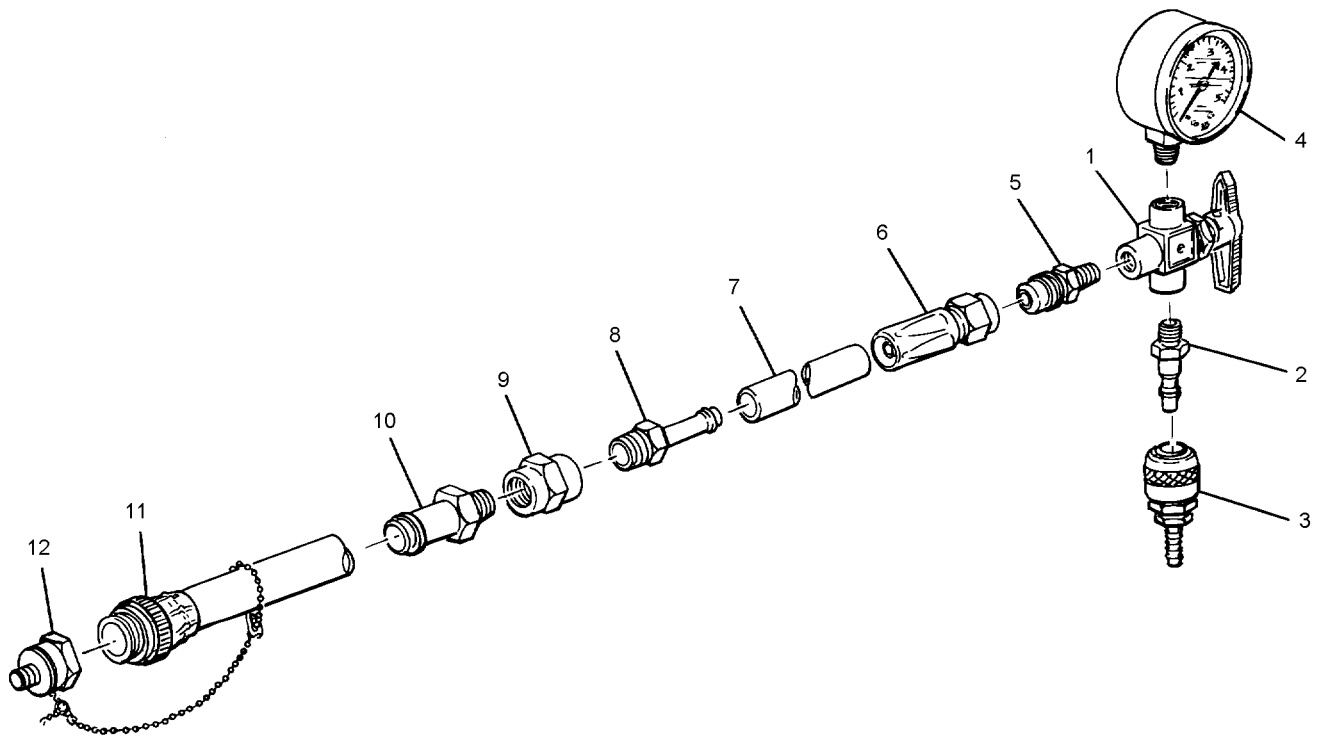
Section 3-3. Illustrated Parts Breakdown (IPB)

3-7. GENERAL.

3-8. This section lists and illustrates the assemblies and detail parts of the Special Tools and Support Equipment for Liferrafts.

3-9. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

3-10. [Figure 3-3](#) illustrates the leak test fixture as used on all liferafts except LRU-18/U. Items with Usable on Code A are not required on test fixture when used for LRU-18/U.



10030003

Figure 3-3. Leak Test Fixture for Liferafts

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
3-3		LEAK TEST FIXTURE, LIFERAFT	REF	
-1	B-43XF4	. VALVE, 3-way with vent (12623)	1	
		(NOTE 1)		
-2	MIL-C-4109	. COUPLING, air hose (male)	1	
		(NOTE 2)		
-3	MIL-C-4109	. COUPLING, air hose (female)	1	
		(NOTE 2)		
-4	P-734	. GAGE, Pressure, 0 to 5 psig	1	
		(NOTE 3)		
	40R31-2	. GAGE, Pressure, 0 to 15 psig	1	
		(NOTE 4)		
	CC-TM-12	. MANOMETER, Mercury, calibrated	1	
		0 to 6 psig (75331)		
-5	AN816-4-8D	. REDUCER, 3/4-inch tubing	1	
		to 1/2-inch pipe		
-6	MS27404-8D	. FITTING, Hose	1	
-7	No Number	. HOSE, Rubber, 1/2-inch	A/R	
		ID, 3/4-inch OD		

NAVAIR 13-1-6.1-1

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
3-3-8	AN840-8	. ADAPTER, Hose to pipe thread	1	A
-9	AN910-3D	. COUPLING, Pipe thread	1	A
-10	AN840-10	. ADAPTER, Hose to pipe thread	1	A
		(NOTE 5)		
-11	MIL-P-8258	. HOSE, Liferaft hand pump	1	A
		(NOTE 5)		
-12	MS21962	. ADAPTER, Hose to liferaft	1	A
		(NOTE 6)		
	NOTE: 1. NSN: 6685-00-953-9090 2. Select quick-disconnect coupling compatible with local low pressure air installation. 3. NSN: 6685-00-953-9090 4. NSN: 9G-6685-00-942-8127 5. Cut hose from salvaged liferaft hand pump. 6. Adapter can be obtained from salvaged liferaft hand pump.			

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
-------------	----------------------------	--------------

AN816-4-8D	3-3-5
AN840-8	3-3-8
AN840-10	3-3-10
AN910-3D	3-3-9
B-43XF4	3-3-1
CC-TM-12	3-3-4

Part Number	Figure and Index Number	SM&R Code
-------------	----------------------------	--------------

MIL-C-4109	3-3-2
MIL-C-4109	3-3-3
MIL-P-8258	3-3-11
MS21962	3-3-12
MS27404-8D	3-3-6

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CHAPTER 4

LR-1 LIFERAFT ASSEMBLY

Section 4-1. Description

4-1. GENERAL.

4-2. The LR-1 is a one-man liferaft utilized with various soft and hard type survival kits. It is intended for use by an aircrewmember forced down at sea. It can also be used when forced down over land for fording rivers and streams or as shelter. See [figures 4-1 through 4-6](#).

NOTE

The CNO has established new survival equipment lists as standards to be utilized by all concerned. These lists provide for an effective 24-hour survival capability and are incorporated in this chapter.

4-3. CONFIGURATION.

4-4. The LR-1 liferaft assembly consists of a inflation assembly (CO₂ cylinder and inflation valve) and a one-man liferaft constructed of polychloroprene-coated cloth. Three types of CO₂ cylinders and one type of inflation valve, FLU-6/P or modified FLU-6/P is available. The liferaft consists of a single compartment flotation tube with a non-inflatable floor. It is blue in color and features a weathershield, sea anchor, sea anchor pocket, retaining line pocket, and ballast bags. The weathershield is nonspecular sea blue in color on the outside and bright red on the inside. The survival items which may be required in LR-1 liferaft assemblies are listed for reference only in [table 4-1](#), and most must be individually requisitioned.

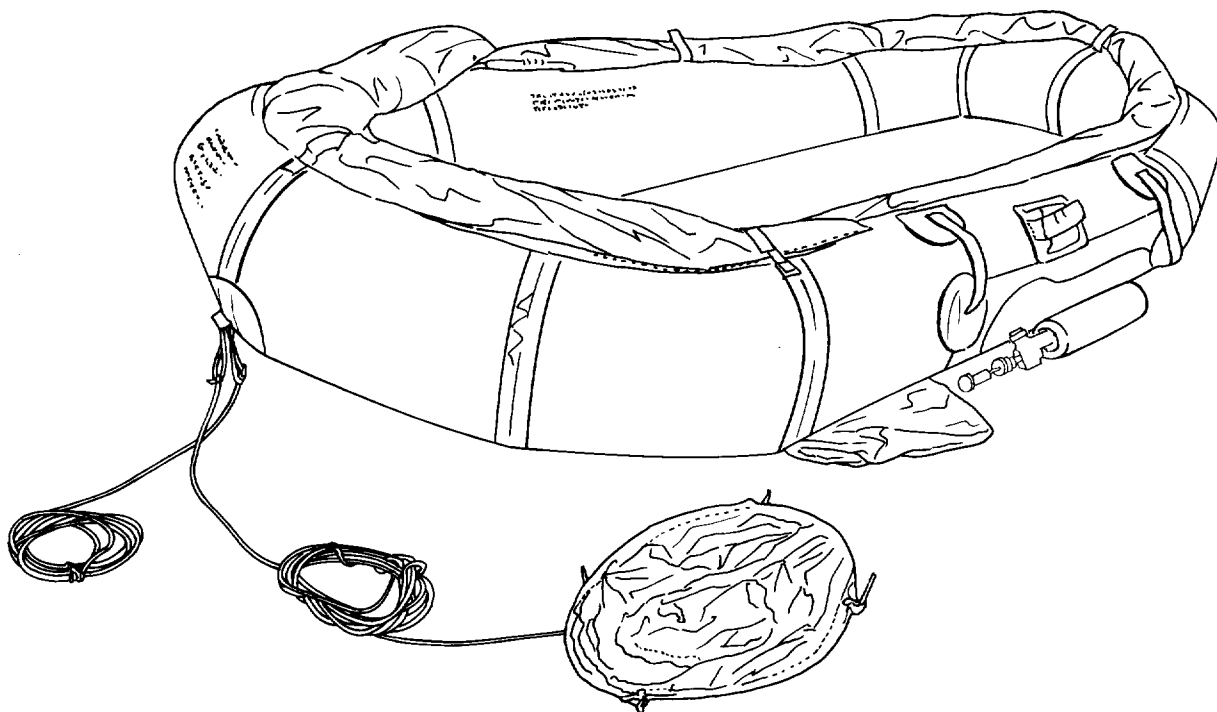


Figure 4-1. LR-1 Liferaft Assembly

10040001

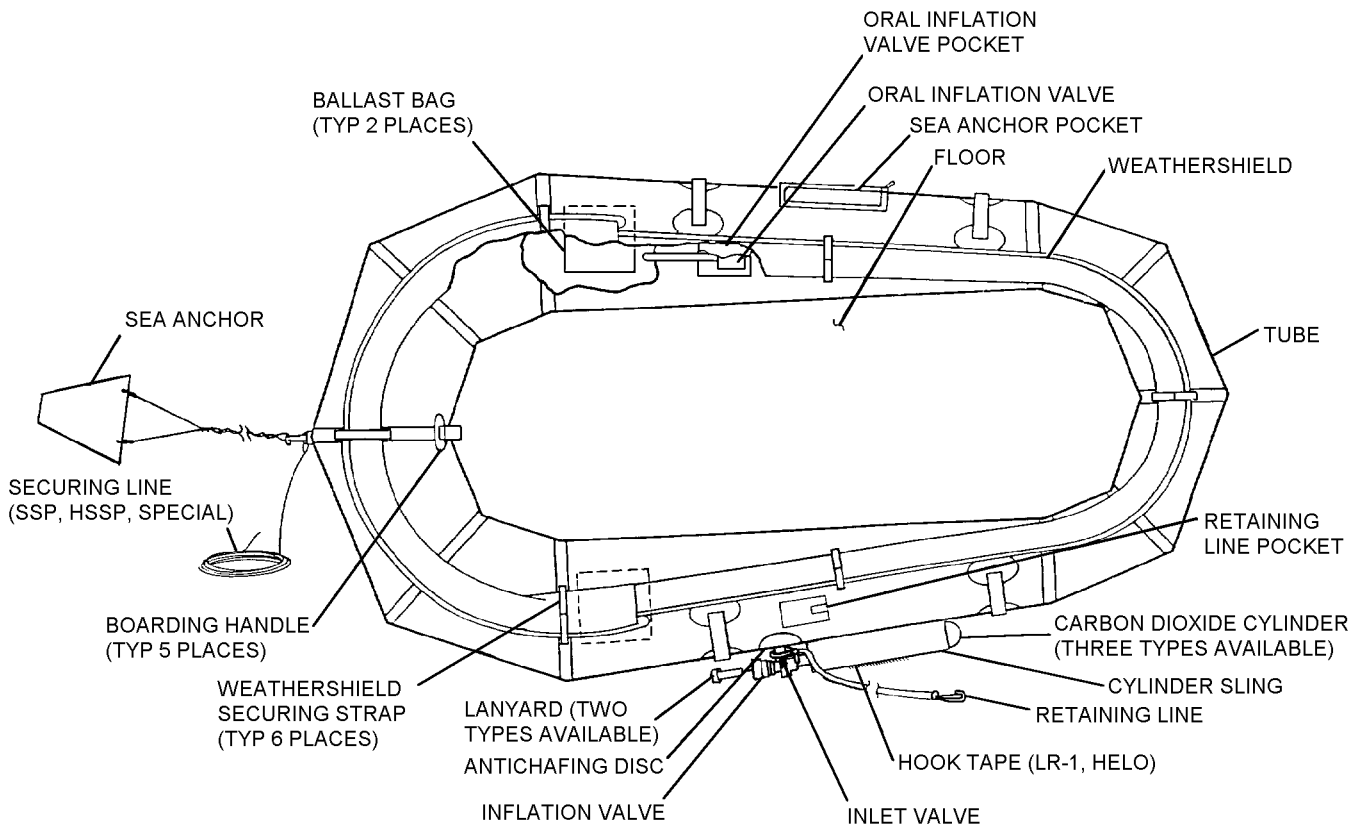


Figure 4-2. LR-1 Liferaft Assembly, Parts Nomenclature

10040002

4-5. APPLICATION.

4-6. The type of packaged LR-1 liferaft assembly used aboard various types of aircraft is shown in [table 4-2](#).

4-7. FUNCTION.

4-8. The LR-1 liferaft assembly is inflated either manually by pulling the inflation assembly actuating lanyard or automatically on LR-1 (RSSK) by gravity drop on kit actuation. The inflation assembly inflates the flotation tube. After boarding, the LR-1 may be topped off by using the oral inflation valve.

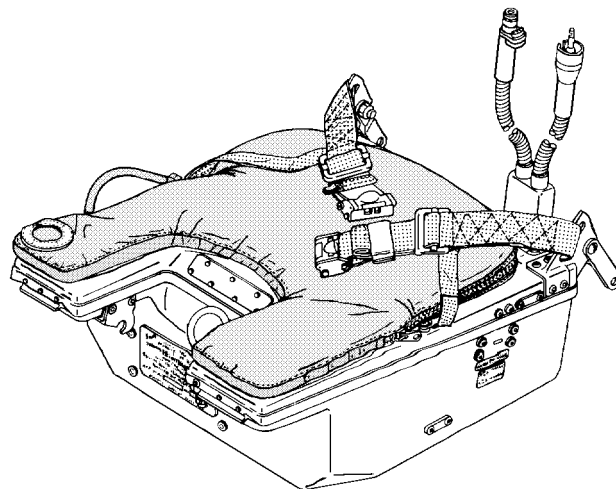


Figure 4-3. Typical Rigid Seat Survival Kit

10040003

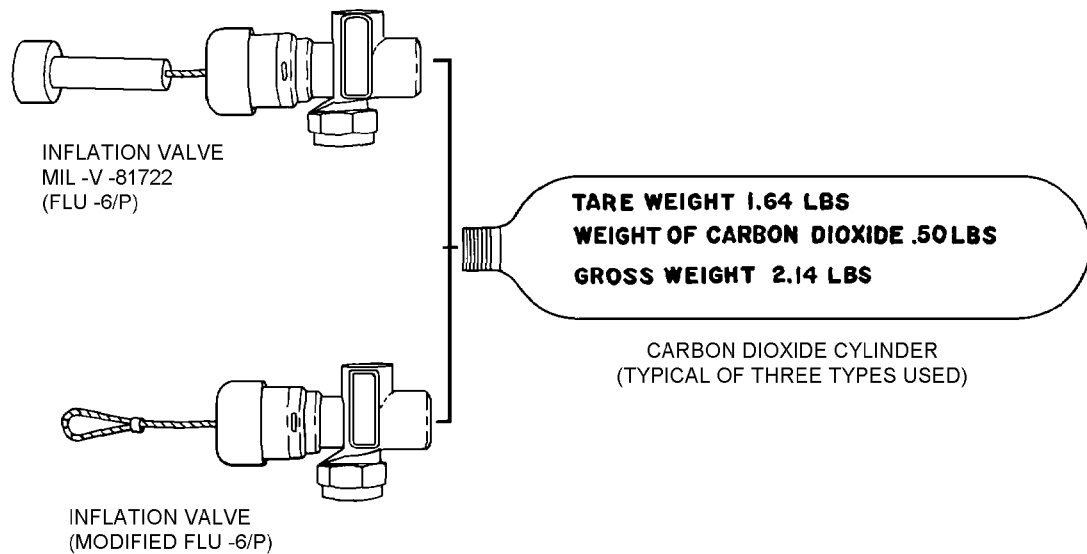


Figure 4-4. Alternate Inflation Valve Assemblies

10040004

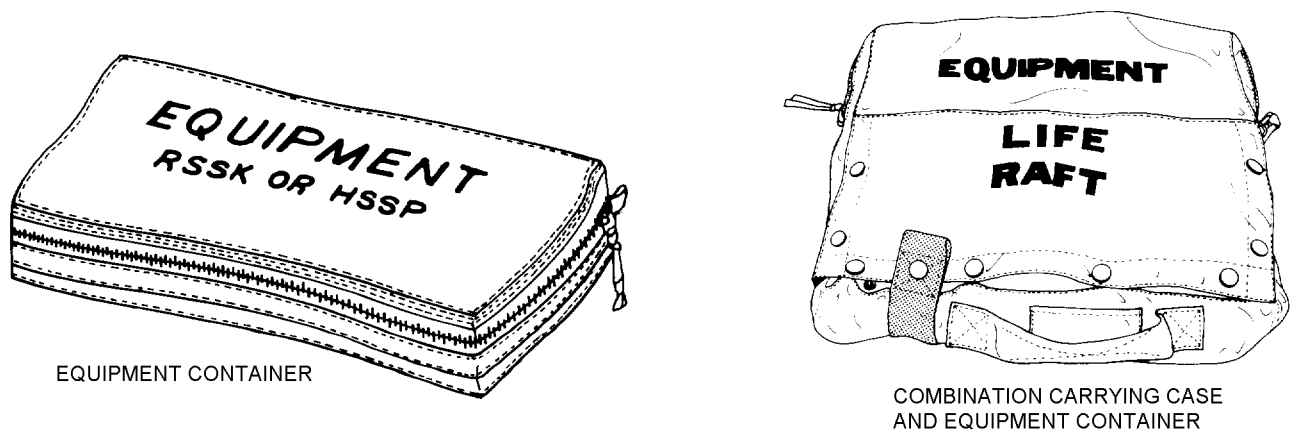


Figure 4-5. Equipment Container and Combination Carrying Case and Equipment Container

10040005

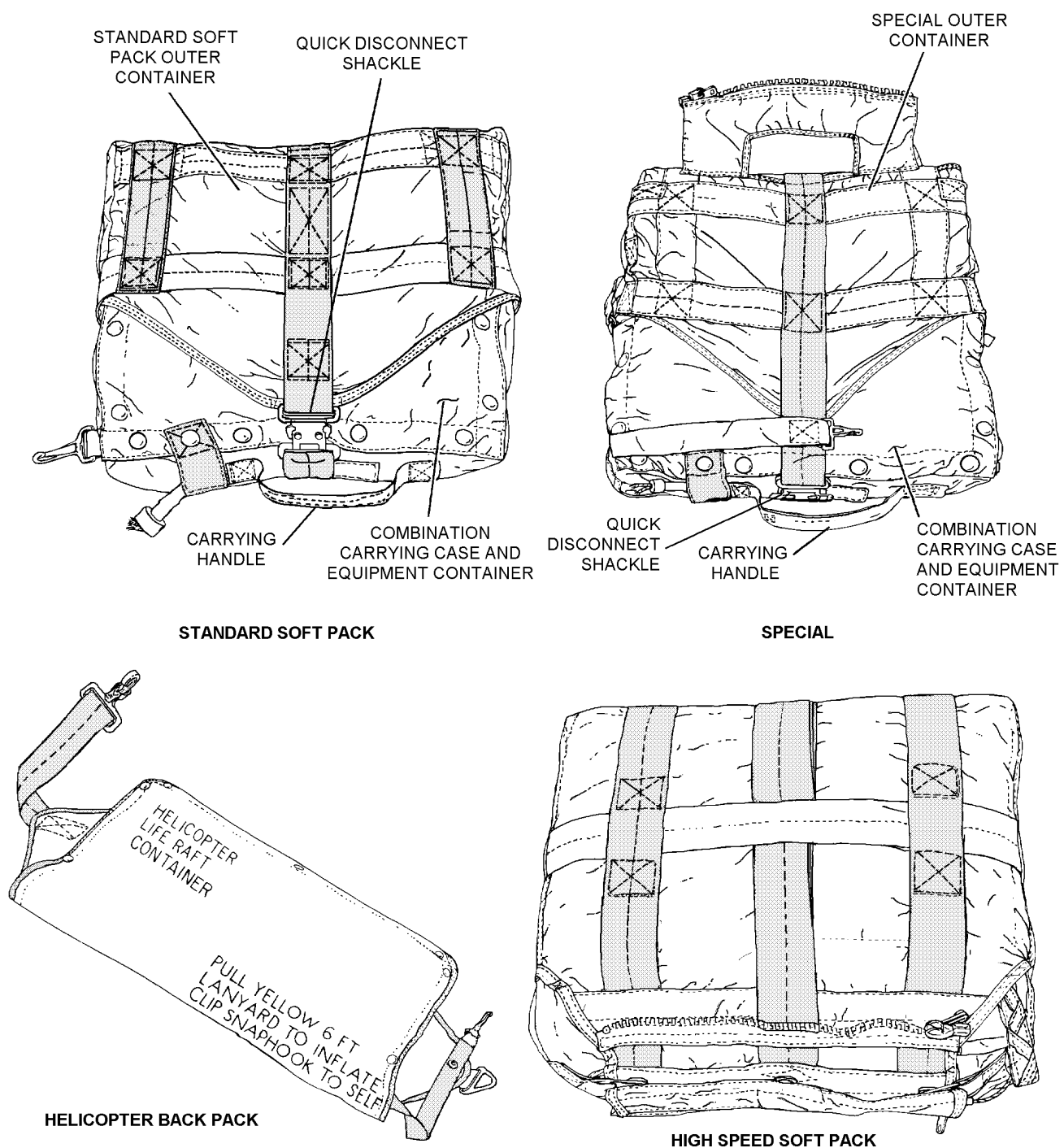


Figure 4-6. Packaged LR-1 Liferaft Assemblies

10040006

Table 4-1. LR-1 Survival Items

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Dye Marker	2	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal, MK-124 MOD 0	2	—	01-030-8330	
Emergency Radio Beacon AN/URT-33A	1	MIL-B-38401A	00-160-2136	PAOGG
Battery Power Supply (Note 3)	1	P/N A3-03-0052 (CAGE 18560)	00-168-8628	PAOZZ
Water, Drinking, Bagged, Emergency (Note 2)	3		01-124-4543	PAOZZ
Cord, Nylon, Utility, 50 feet	1	MIL-C-5040	00-262-2148	PAOZZ
SRU-31/P Individual Survival Kit (Part 1 - Medical, Part 2 - General)	1	MIL-S-81941	00-478-6504	PCOZZ
Ground Air Emergency Code Manual	1	NAVAIR 00-25-213	0800-LP-000-1500	—
Combat Casualty Blanket Type II, 3 oz.	1	MIL-B-36964	00-935-6666	PAOZZ
Bailing Sponge	1	P/N L-S-626 (CAGE 81348)	00-240-2555	PAOZZ
Personnel Lowering Device (Note 1)	1	CL213D2-1	00-451-3324	
Notes: 1. Optional item. 2. Deleted. 3. Refer to NAVAIR 16-30URT33-1 for battery service life.				

Table 4-2. LR-1 Aircraft Applications

Packaged LR-1 Liferaft Assembly	Aircraft		
Standard Soft Pack Assembly (Note 1)	C-2A E-2A E-2B	E-2C T-34B	KC-130F KC-130R
High Speed Soft Pack Assembly	A-4B A-4C A-4E	KC-130F KC-130R	
High Speed Soft Pack (Modified) Assembly	T-39E	CT-39G	
Rigid Seat Survival Kit 1/1A	F-4B F-4J	F-4K F-4M	F-4N RF-4B
Rigid Seat Survival Kit 3	T-2		
Rigid Seat Survival Kit 8/8A	A-4F A-4M A-7C	TA-4J A-7A TA-4F	A-7E S-3A A-7B
Helicopter Back Pack Assembly (Note 2)	All Helicopters (except AH-1 series)		
SKU-2/A (Note 2)	F-14 KA-6D	A-6E EA-6A	EA-6B
SKU-3/A (Note 2)	F-18		
SKU-4/A	A-7		
SKU-6/A	AV-8B	TAV-8B	
SKU-12/A (Note 3)	A-6E KA-6D	EA-6A EA-6B	F-14
<p>NOTE:</p> <ol style="list-style-type: none"> 1. E-2 Aircraft equipped with the A/P22P-11 Crew Backpack utilize the LRU-18/U One Man Vee Bottom Liferaft. 2. LR-1 Liferrafts will be replaced with LRU-18/U One Man Vee Bottom Liferaft in Helicopter Back Pack Assemblies on an attritional basis. 3. The LRU-23/P Liferaft Assembly is installed in seat survival kits used in F-14 and F/A-18 aircraft equipped with SJU-17(V)1A through SJU-17(V)4A ejection seats. 			

Section 4-2. Modifications

4-9. GENERAL.

4-10. There are no authorized modifications to the LR-1 liferaft assembly at this time. Common repairs and fabrications are listed in [table 4-3](#).

Table 4-3. LR-1 Common Repairs and Fabrications

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	4-46
Cementing Liferafts	4-47
Patching Liferafts	4-48
Recementing or Replace Seam Tapes	4-49
Sea Anchor/Mooring Line Replacement	4-50
Fabrication of Antichafing Disc	4-52
Fabrication of Retaining Line	4-53
Fabrication of Boarding Handle Assembly	4-54
Replacement of Securing Line	4-55 (Note 1)
Replacement of MIL-V-25492 Inflation Valve with MIL-V-81722 (FLU-6/P) Inflation Valve	4-56 (Note 2)
Installation of Hook Tape on Cylinder Sling	4-57 (Note 3)
Modification of CO ₂ Inflation System	4-58 (Note 3)
Modification of FLU-6/P used on RSSK Systems	4-59 (Note 2)
Modification of HSSP and Cylinder Sling	4-60 (Note 4)
Repair of Helo-Backpack Carrying Case	4-60A
Replacement of Oral Inflation Valve	4-61
Notes: 1. Used with HSSP, SSP and Special Soft Pack 2. Used with RSSK Installation 3. Used with HELO Back Pack 4. Used in T-39 Aircraft	

Section 4-3. Maintenance

4-11. GENERAL.

4-12. This section contains information on inspection, disassembly, repair/replacement, testing, and reassembly of the LR-1 liferaft.

4-13. INSPECTION.

4-14. All liferaft assemblies shall be subjected to the following inspections: Place-In-Service, Daily/Pre-Flight, Special, Phase/Isochronal Scheduled Inspection System and Acceptance Inspections.

NOTE

Refer to NAVAIR 13-1-6.3-1 and 13-1-6.3-2, Seat Survival Kits, for inspection requirements for Rigid Seat Survival Kits (RSSK).

4-14A. The Place-In-Service Inspection shall be performed on all new assemblies or assemblies being returned from vendor repair or overhaul. The Aircraft Intermediate Maintenance Department performs this inspection.

4-15. The Daily/Preflight Inspection shall be performed on fuselage-installed liferafts prior to first flight of the day. This inspection shall be performed by line personnel (plane captain or delegated aircrew-member) who have been designated by the line division officer, instructed and found qualified by the Aviator's Equipment Branch.

4-16. Special Inspections performed on aircraft installed liferafts shall coincide with the Periodic Maintenance Requirements of the aircraft on which they are installed, not to exceed 36 days.

4-17. All liferafts shall be subjected to Phase/Isochronal Scheduled Inspection System (ISIS) inspections coinciding with the aircraft on which they are installed, with the exception of the Helicopter Backpack which shall be inspected every 360 days. The Phase/ISIS inspections shall be performed by the intermediate level of maintenance or above.

4-18. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality

Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

NOTE

A functional test and pull cable proof load test shall be performed prior to placing in service or during aircraft Acceptance Inspection, and each fourth inspection cycle thereafter. A leakage test shall be performed at each inspection cycle. If inspection indicates damage beyond capability of maintenance, complete applicable forms and forward entire assembly to supply. Refer to [paragraph 4-46](#) for determination of repairability.

4-18A. PLACE-IN-SERVICE INSPECTION. The Place-In-Service Inspection consists of the following steps:

1. Container/case inspection.
2. Functional test.
3. Pull cable proof load test.
4. Functional test and adjustment of manifold (if applicable).
5. Deflation.
6. Visual.
7. Liferaft configuration.
8. General inspection.
9. Markings inspection.
10. Survival items and accessories inspection.
11. Inflation assembly inspection (charged and discharged).
12. Cylinder markings inspection.
13. Leakage test.
14. Records initiation and validation of serial numbers.
15. Packing/rigging.

4-19. DAILY/PREFLIGHT/SPECIAL INSPECTION. To perform a Daily/Preflight/Special Inspection, visually inspect for the following:

CAUTION

Do not open liferaft access doors, RSSK kits or any sealed or safety-wired/safety tied portion of liferaft for this inspection.

1. Fabric for cuts, tears, deterioration and abrasion.
2. Seams for proper adhesion or stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage and security.
5. All hardware for security of attachment, corrosion, damage, wear, and if applicable, ease of operation.
6. Liferaft retaining line for proper stowage.
7. Liferaft painter line for presence and attachment.
8. Heaving line for proper stowage (if applicable).
9. That liferaft is properly stowed. Check for bulges caused by trapped air in liferaft.
10. Ripcord pins and cable for bends, fraying, or other damage; ripcord pins for security of attachment to cable.
11. Swaged ball on handle and swaging sleeve on cable for security.

WARNING

Use only authorized safety tie. No tape, wire, or cord shall be employed to secure ripcord pins.

12. Ripcord pins fully inserted into cones, and first and last (HSSP: first and third) ripcord pins safety-tied to cones with one turn size E nylon thread (V-T-295), single.

13. Snap fasteners on end flaps and ripcord protector flap (HSSP: slide fastener on ripcord protector flap) securely fastened.

14. If discrepancies are found or suspected, Maintenance Control shall be notified.

4-20. ACCEPTANCE/ISIS/PHASE INSPECTION. The Acceptance/ISIS/Phase Inspection consists of the following major tasks (to be performed in the order listed):

1. Container/Case Inspection
2. Functional Test (If Required)

3. Pull Cable Proof Load Test (If Required)
4. Functional Test and Adjustment of Manifold
5. Deflation
6. Visual
7. Liferaft Configuration
8. General Inspection
9. Markings Inspection
10. Survival Items and Accessories Inspection
11. Inflation Assembly Inspection
12. Inspection of Inflation Assembly (Charged)
13. Inspection of Inflation Assembly (Discharged)
14. Cylinder Markings
15. Leakage
16. Records Updating
17. Repacking

4-21. CONTAINER/CASE INSPECTION. To inspect packed containers/cases, examine the following:

1. Fabric for cuts, tears, deterioration, and abrasion.
2. Seams for proper adhesion of stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage, and security.
5. All hardware for security of attachment, corrosion, damage, wear and, if applicable, ease of operation.
6. Container and/or case for stains, dirt, and general condition.

4-22. FUNCTIONAL TEST. To functionally test a liferaft, proceed as follows:

CAUTION

Ensure that there is adequate area free of foreign objects for liferaft inflation.

1. Open liferaft carrying case and unfold liferaft.
2. Actuate inflation assembly.
3. Measure time of inflation; liferaft shall inflate to design shape without evidence of restriction in less than 1 minute.

4. Examine liferaft for obvious damage such as cuts, tears, ruptured seams, and damaged inlet valve.

5. Determine cause if liferaft does not properly inflate. Remove CO₂ bottle and inflation assembly, inspect for cleanliness. Inspect inlet valve on liferaft for imbedded foreign matter.

6. If correction is made, repeat [steps 2 through 5](#).

7. Deflate liferaft in accordance with [paragraph 4-24](#). Ensure that all carbon dioxide has been removed.

4-23. PULL CABLE PROOF LOAD TEST. To perform the proof load test, proceed as follows:

NOTE

Perform the Proof Load Test only after the functional test and prior to placing an inflation assembly in service.

- 1. Remove inflation valve plastic valve sleeve.
- 2. Remove pull cable from valve and apply a 50-pound pull force between cable ball and pull toggle.
- 3. Examine pull cable for broken strands of wire, deformed pull toggle and loose or cracked swage fittings. If any damage is found, the pull cable shall be discarded and replaced with a new cable. The new cable shall also be tested in accordance with [step 2](#). If pull toggle is loose, it may be repaired or replaced at the discretion of the inspection activity.

4. If pull cable passes this test, reinstall in accordance with [paragraph 4-42](#).

4-24. DEFLATION. To deflate liferaft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Vacuum Unit	61E44688 (CAGE 80049)
As Required	Hose, Rubber, 3/8 or 1/2 inch Inside Diameter	—

- 1. Attach one end of rubber hose to vacuum pump.

2. Deflate through oral inflation valve. Unlock oral inflation valve, hold in open position, and hold vacuum pump hose against end of inflation valve. When compartment is collapsed, release oral inflation valve and screw lock closed.

4-25. VISUAL INSPECTION. To visually inspect the liferaft, proceed as follows:



Remove CO₂ cylinder prior to inflating liferaft with air.

- 1. Remove CO₂ cylinder from CO₂ cylinder sling.
- 2. Install diffuser plug in LR-1 CO₂ cylinder inflation valve.

NOTE

If a suitable air source is not available, water pumped nitrogen (FED SPEC BB-N-411) may be substituted.

Prior to visually inspecting a liferaft assembly, the liferaft (and inflatable floors, if applicable) shall be inflated with air to 1.0 psig.

- 3. Inflate liferaft with air to 1.0 psig.

4-26. LIFERAFT CONFIGURATION. The liferaft shall be updated by comparing it to [figures 4-1 and 4-2](#).

4-27. GENERAL INSPECTION. To perform the general inspection, inspect the following:

NOTE

If color, location, or stitching patterns of repaired, replaced, or previously incorporated noncritical items or features (eg, liferaft pockets, handle, ballast bag, sea anchor, etc.) do not exactly conform to instructions, do not remove or rework item or feature if flotation stability or capability and security of attachment are not compromised.

- 1. Liferaft fabric for cuts, tears, punctures, deterioration and abrasion.
- 2. Seam tapes for proper adhesion.

3. Seam tapes joining tubes to floors, other tubes or canopy for adhesion and wear.

4. Lifteraft floor and canopy for cuts, tears, punctures, and abrasions.

5. All patches for proper adhesion.

6. Pockets for tears, abrasions, and security of attachment.

7. Handles for wear, deterioration, and security of attachment.

8. Sea anchor for wear, tears, and security of attachment.

9. Presence and condition of securing line.

10. Oral inflation tube for deterioration.

11. All hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.

12. Lifteraft for stains, dirt, and general cleanliness.

13. Any other parts for wear and damage.

4-28. MARKINGS INSPECTION. Compare markings on liferaft and case and/or container to markings shown in [tables 4-4](#) and [4-5](#). Restore faded markings. Correct any markings which do not agree with the applicable table. To change markings, proceed as follows:

Table 4-4. LR-1 Lifteraft Markings

Markings	Location	Letter Height
LIFERAFT, INFLATABLE, ONE-MAN TYPE LR-1 MIL-L-81542A(AS) CONTRACT NO. [applicable number] MANUFACTURER DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Port side, on outboard side of tube adjacent to sea anchor mooring patch	1/2 inch Yellow (See Note)
TO INCREASE PRESSURE, UNSCREW KNURLED RING, PUSH VALVE MOUTHPIECE DOWN AND IMMEDIATELY BLOW THROUGH INLET	Inboard side of tube adjacent to oral inflation valve pocket	3/16 inch Yellow (See Note)
RETAINING LINE	Retaining Line Pocket	1/4 inch Yellow
SEA ANCHOR MIL-A-3339B Type I Size 1 MANUFACTURER CONT. NO. [applicable number] DATE OF MANUFACTURE [month and year]	Inside of sea anchor	1/4 inch Red when sea anchor is blue. Blue when sea anchor is natural (white)
THIS LIFERAFT SHALL NOT BE USED UNTIL SUBJECTED TO THE CALENDAR INSPECTION REQUIREMENTS OF NAVAIR 13-1-6.1-1 AVIATION-CREW SYSTEMS MANUAL	Warning tag tied to boarding handle nearest inflation valve	
Note: Replacement markings shall be stamped or stenciled using waterproof black ink. Rafts that have been colored in service do not require marking on retaining line pocket.		

Table 4-5. LR-1 Case and Container Markings

Case/Container	Marking	Location	Letter Height
Standard Soft Pack Outer Container	STANDARD SOFTPACK OUTER CONTAINER	Main panel on either side of adjustable strap	7/8 inch
High Speed Soft Pack Outer Container	[None]		
Helicopter Liferaft (LR-1) Carrying Case	HELICOPTER LIFERAFT CONTAINER	Main panel	3/4 inch
	PULL YELLOW 6 FT LANYARD TO INFLATE CLIP SNAPHOOK TO SELF	Main panel	1 inch
Special Outer Container	[None]		
Combination Carrying Case and Equipment Container	EQUIPMENT	Upper side of equipment compartment	1 inch
	LIFERAFT	Cover Flap of raft compartment	1 inch
Equipment Container	EQUIPMENT	Main panel	1 inch
	RSSK OR HSSP		1/2 inch
Liferaft Cover	[None]		
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.			

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Marking, Laundry, Black	SPE-92 (NIIN 00-161-4229)
	-or-	
	Ink, Drawing, Waterproof, Yellow	A-A-59291 (NIIN 00-634-6583)

1. Paint over incorrect marking using waterproof ink (yellow or black as applicable).

2. Add correct marking as close as possible to specified location using waterproof ink.

4-29. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

1. Inventory all accessories and survival items by checking items against [table 4-1](#). Replace missing or unsatisfactory items.

NOTE

Ensure AN/URT-33A battery service life does not expire prior to the next scheduled calendar inspection. Refer to NAVAIR 16-30URT33-1 for battery service life. Batteries which exceed service life requirements must be discarded regardless of their condition.

2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

NOTE

NAVAIR 13-1-6.5 contains information inspection/replacement and modification of the survival items.

3. Operate all items which are not expended in use. Replace as necessary.

4-30. INFLATION ASSEMBLY INSPECTION. Inspect the inflation assembly as required.

4-31. Inspection of Inflation Assembly (Charged). To inspect a charged inflation assembly, proceed as follows:

WARNING

Gas under pressure. Do not attempt to remove cylinder from valve.

Ensure that diffuser plugs (P/N 1614703-1 (CAGE 99251, NIIN 01-077-1734)) are installed in all LR-1 CO₂ cylinders.

1. Inspect cylinder markings. Re-mark as required in accordance with [paragraph 4-33](#).

WARNING

Damage to the slot that the sliplock is seated in may allow plastic cap and sleeve to unseat. If the sliplock is not seated properly on inflation valves which do not have spring clips installed, it may result in a malfunction of the liferaft inflation process.

1A. On inflation valves which do not have spring clips installed, verify the spring sliplock in the plastic cap and sleeve is properly seated in the slot on the inflation valve. Have technician loosen setscrew and gently move cap in an up and down motion to verify the sliplock is seated. Have technician align setscrew with the vertical groove on the inflation valve and retighten.

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damage or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced perform pull cable proof load test in accordance with [paragraph 4-23](#).

WARNING

Excessive glue around the FLU-6/P valve cap/sleeve may result in a malfunction of the liferaft inflation process. Remove excessive glue, then continue inspection.

3. Examine pull cable for broken strands and loose or defective swage joints. Inspect plastic parts for cracks and breaks. Ensure that valve cap is cemented

to plastic valve sleeve, and plastic valve sleeve is permanently attached to metal valve sleeve. Use polychloroprene adhesive (NIIN 00-515-2246) only.

NOTE

To obtain the correct gross weight of the CO₂ cylinder, subtract weight of the diffuser plug from total weight indicated on scale.

4. Weigh inflation assembly. If weight indicated on scale is not the same as the gross weight printed on the cylinder (with tolerance specified), or if no gross weight is printed on the cylinder, discharge the cylinder and recharge it to 0.49 to 0.51 lbs. of CO₂ in accordance with [paragraph 4-42](#).

4-32. Inspection of Inflation Assembly (Discharged). To inspect a discharged inflation assembly, proceed as follows:

1. Inspect cylinder markings. Re-mark as required in accordance with [paragraph 4-33](#).

WARNING

Damage to the slot that the sliplock is seated in may allow plastic cap and sleeve to unseat. If the sliplock is not seated properly on inflation valves which do not have spring clips installed, it may result in a malfunction of the liferaft inflation process.

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, dents and any distortion to the lip of the slot that sliplock is seated in. If damaged or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced, perform pull cable proof load test in accordance with [paragraph 4-23](#).

3. (MIL-V-81722 Valve, FLU-6/P) Examine pull cable for broken strands and loose or defective swage joints. Inspect plastic parts for cracks and breaks. Ensure that valve cap is cemented to plastic valve sleeve, and plastic valve sleeve is permanently attached to metal valve sleeve. Use polychloroprene adhesive (NIIN 00-515-2246) only.

4. Recharge assembly in accordance with [paragraph 4-42](#).

4-33. Cylinder Markings. Markings on all CO₂ inflation cylinders shall be in black letters 1/4-inch high. Information shall include gross weight, tare weight, and

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weight of CO₂. Paint and stencil cylinder as required. The weight of CO₂ is 0.49 to 0.51 lbs. Ensure that all markings are included as necessary.

4-34. LEAK TEST. To perform a leak test, proceed as follows:

4-35. Test Procedure. Use test fixture described in [Chapter 3](#) to test liferaft for leakage as follows:

CAUTION

Ensure that area surrounding liferaft is clear of foreign objects. Liferaft should not be disturbed during leakage test.

If three-way valve is not used, measuring device valve must be closed when air-feed valves are open.

On LR-1 liferaft, damage may occur to oral inflation valve if air supply pressure entering the liferaft exceeds ten (10) psi during this test.

NOTE

If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

1. Unlock oral inflation valve and insert into 1/2-inch diameter rubber hose. Open valve to air supply and inflate liferaft. Alternately position valve at measuring device, vent and air supply until proper pressure of 2.0 psig is attained.

2. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure shall be readjusted, if necessary, to the leakage test pressure.

3. Disconnect air supply and check for leaks. Ensure that all valves are closed. Record time.

4. Record temperature and barometric pressure and allow raft to remain undisturbed for a minimum of 4 hours.

NOTE

If the raft has been stacked during the 4-hour inspection period remove from stacking and place in a horizontal position on the floor or table in the inspection area and take test pressure reading. In no event

shall the pressure in the raft be determined with another raft stacked upon it.

5. After a minimum of 4 hours after completing [step 3](#), record the test pressure. Test pressure shall not decrease to less than 1.6 psig from a maximum test pressure of 2.0 psig.

NOTE

Steps 6 through 15 shall be performed only after leakage test readings have been recorded.

6. Record temperature and barometric pressure and correct test pressure for any changes in temperature and barometric pressure. Refer to [tables 4-6](#) and [4-7](#).

EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	- 5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057

UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

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Table 4-6. Temperature Conversion Chart

Temperature Difference (Degree F.)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.248
9	0.279
10	0.310

Rise in temperature: subtract from gage reading. Fall in temperature: add to gage reading.

Table 4-7. Barometric Pressure Conversion Chart

Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368
Rise in pressure: add to gage reading. Fall in pressure: subtract from gage reading.									

7. If pressure of compartment is below pressure limits of 1.6 psig, inflate to leakage test pressure of 2.0 psig and check for leaks, using a soap solution. Mark leaks, rinse with fresh water, and dry with a lint free cloth. Determine repairability in accordance with [paragraph 4-46](#).

8. Check operation of inlet check valve by depressing stem. Air must escape. Release stem, and flow of air must stop. Apply soap solution to valve and check for leakage. Inspect valve for damage, excessive wear and corrosion.

9. Depress end of oral inflation valve and air must escape. Release valve and flow must stop. Inspect valve and tube for damage and excessive wear.

10. Deflate liferaft in accordance with [paragraph 4-24](#).

11. Attach retaining line to neck of cylinder with a lark's head knot.

12. Install antichafe disc.

13. (LR-1 with MIL-V-81722, FLU-6/P Inflation Valve.) Pass loop end of webbing retaining line around inflation valve at cylinder neck. Pass end of line with snaphook through loop and pull line tight, forming a lark's head knot. Tack lark's head knot with two turns of waxed, nylon 6-cord, single. Tie ends with surgeon's knot followed by square knot.

14. Reinstall properly charged inflation assembly.

15. Tighten coupling nut to liferaft inlet valve to a torque value of 80 to 90 in-lb.

4-36. RECORDS UPDATING. Make necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

4-37. CLEANING AND SERVICING.

4-38. Cleaning and servicing consists of cleaning the liferaft and containers and/or cases, replacing the safety disc and washer on inflation valves, and recharging CO₂ cylinders.

4-39. CLEANING OF LIFERAFTS. To clean liferafts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint-Free, Type II	MIL-C-85043 NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Solvents are not to be used in the cleaning of liferafts.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.
2. Apply cleaning solution to soiled area with a spray or sponge.
3. Allow solution to remain on the surface for several minutes, then agitate with a soft brush or rag.
4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.
5. Dry liferaft with a lint-free cloth and apply a light coating of talc.

4-40. CLEANING OF CONTAINERS AND/OR CASES. Clean in accordance with [paragraph 4-39](#).

4-41. REPLACEMENT OF SAFETY DISC AND WASHER ON INFLATION VALVES. (See [figure 4-7](#).) To replace safety disc and washer on inflation valve assembly proceed as follows:



Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve or valve safety disc plug from a charged CO₂ assembly.

Materials Required

Quantity	Description	Reference Number
1	Repair Kit (Insert, Washer, Disc)	903684 (CAGE 33525) NIIN 00-703-7811
1	Wrench, Torque	—
1	Socket, 5/16 inch	—
1	Hex Stock, 5/16 x 2 inch Length	—

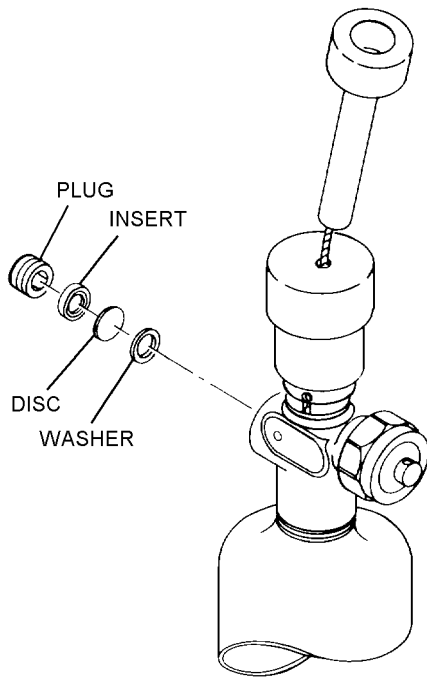
1. Remove cylinder from liferaft.
2. Remove safety disc plug; insert safety disc and washer.
3. Place new washer into inflation valve safety disc orifice.
4. Place new safety disc into inflation valve safety disc orifice:
5. Replace insert and safety disc plug.

NOTE

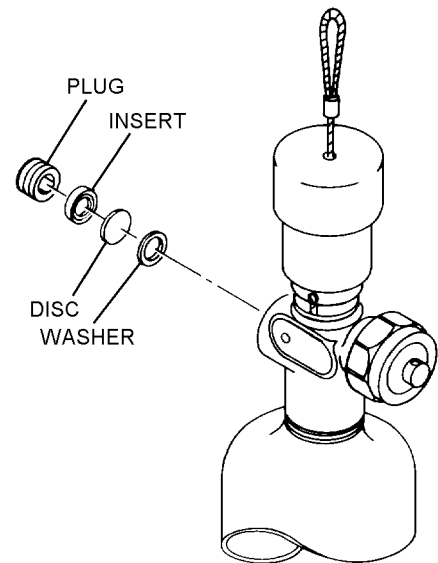
While tightening the safety disc plug, align insert with plug.

6. Tighten safety plug to 15 to 17 ft-lb torque. ■

4-42. RECHARGING. To recharge the inflation assembly, proceed as follows (see [figure 4-8](#)):



INFLATION VALVE
FLU - 6/P



INFLATION VALVE
FLU - 6/P
(MODIFIED)

Figure 4-7. Disassembly of Inflation Valve Safety Disc Assembly

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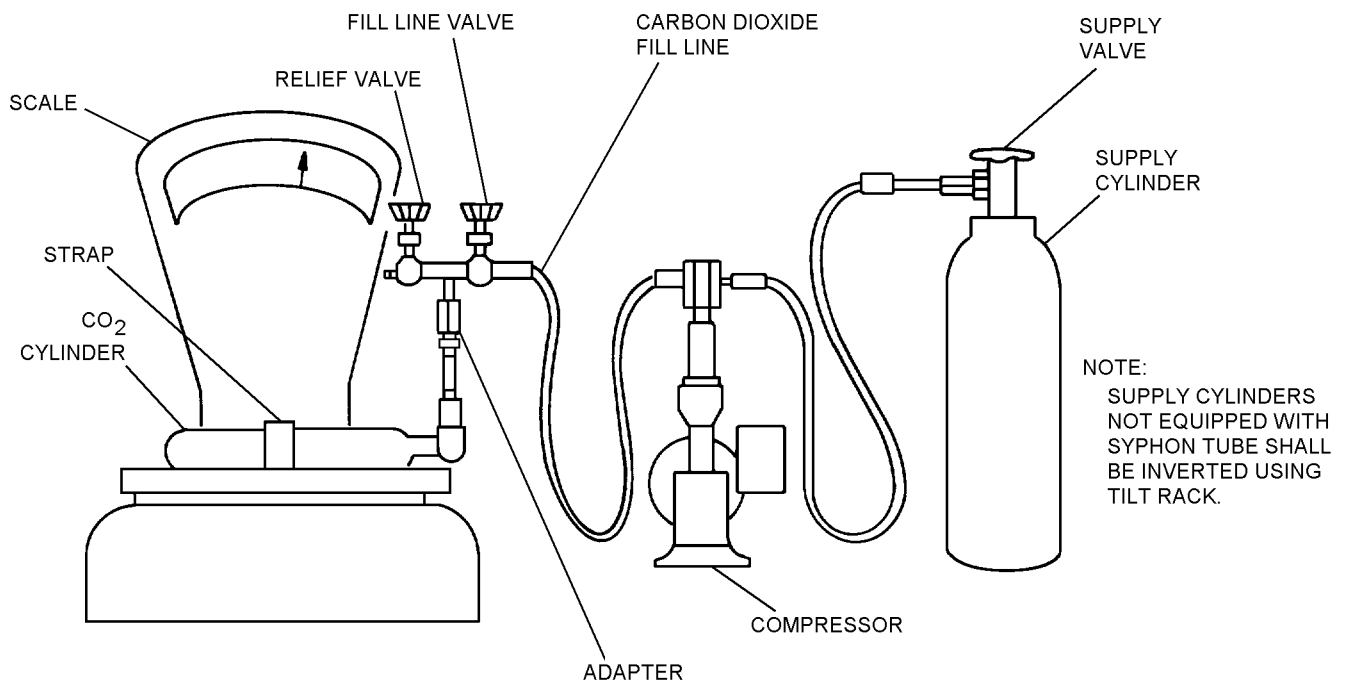


Figure 4-8. Recharging Schematic

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WARNING

When discharging partially charged or overcharged CO₂ cylinders, hold firmly in place with a suitable holding device (vice). Protect CO₂ cylinder from vice jaws with cloth or a suitable substitute. Position cylinders so escaping gas is not directed toward any personnel.

NOTE

Charged inflation assemblies used as spare replacements shall be inspected in accordance with [paragraph 4-32](#) prior to raft installation.

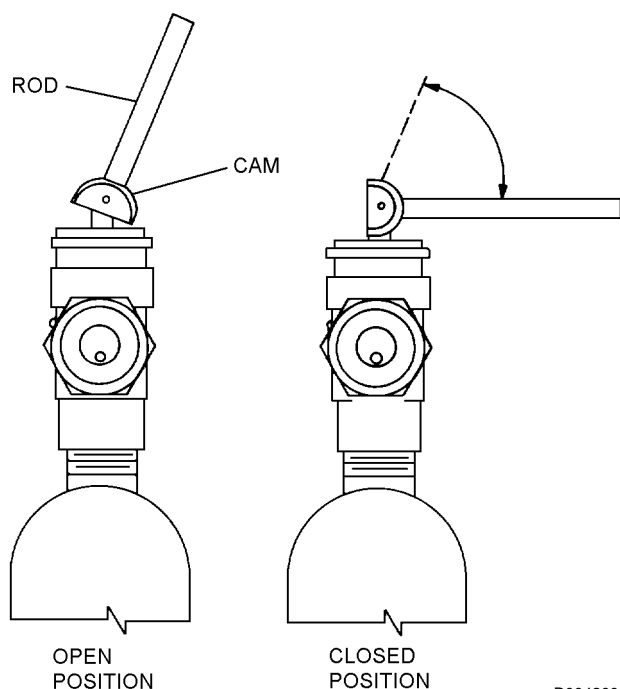
To perform the following filling procedures it is necessary to ensure that CO₂ cylinder is completely discharged.

1. (Inflation Valve FLU-6/P) Remove setscrew. Using small paper clip, raise spring slip-lock in slot on plastic sleeve. Remove plastic sleeve.

NOTE

To facilitate sleeve removal, insert 0.260 to 0.265-inch diameter rod through hole in cap and into hole in cam.

2. Rotate cam 2 or 3 times to ensure proper operation. Remove diffuser plug, if installed.



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3. Weigh and record tare weight (empty weight cylinder, valve and cable assembly) of inflation assembly. Correct tare weight marking on cylinder if necessary.

NOTE

Supply cylinders not equipped with siphon tube must be inverted during transfer operation. Inverting cylinder allows the liquid to flow from the valve. Supply cylinders with siphon tube (straight pipe) extending from the valve to the bottom of the cylinder can be emptied in the vertical position.

4. Install proper charging adapter on inflation assembly.

5. Secure inflation assembly to weighing pan.

6. Open supply cylinder valve, fill line valve and relief valve to purge fill line. Close fill line valve and relief valve.

NOTE

Ensure fill line is free from contact with any object along entire distance from compressor to charging adapter. If fill line does not hang free, accurate weight readings cannot be obtained.

7. Connect fill line to inflation assembly and zero scale.

NOTE

Proper charge weight of CO₂ is 0.49 to 0.51 lbs for cylinder types MS26545B2C0020, MS26545B4C0020 or MS26545B4C0021.

8. Ensure inflation assembly valve is open.

9. Open fill line valve.

10. Allow carbon dioxide to cascade from supply cylinder into inflation assembly. If gross weight (tare weight plus weight of charge is 0.49 to 0.51 lbs) cannot be reached, start compressor and complete charging. Stop compressor upon reaching proper gross weight.

11. Close fill line valve.

12. Close inflation assembly valve. Open relief valve on fill line valve if applicable.

13. Disconnect fill line from inflation assembly. Remove charging adapter.

14. Measure gross weight of charged inflation assembly.

15. If gross weight of inflation assembly is greater than required, carefully bleed off excess from inflation assembly. If gross weight is less than required, reinstall charging adapter and repeat [steps 6 through 15](#).

16. Reinstall diffuser plug, if applicable.

NOTE

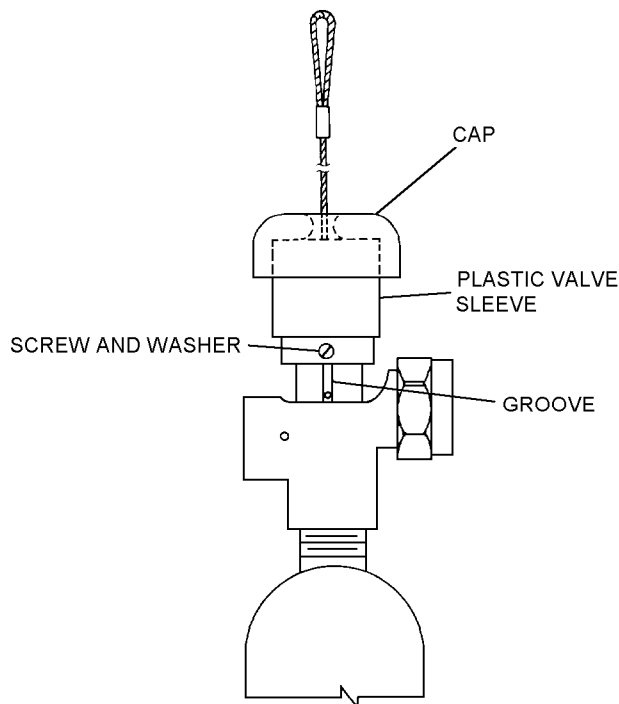
When other cylinders are to be recharged immediately, leave supply cylinder valve open.

17. Close supply and bleed system pressure.

WARNING

If spring sliplock is not properly seated in the slot on inflation valves which do not have spring clips installed, it may result in a malfunction of the inflation process.

18. Place ball end of cable through sleeve and into hole in cam. Align screw hole in sleeve with groove on valve and slide sleeve over cam and onto valve. Using a paper clip, raise spring sliplock in slot on sleeve and ensure sleeve is fully seated and raised. Install screw and washer. On inflation valves which do not have spring clips installed, verify the spring sliplock in the plastic cap and sleeve is properly seated in the slot on the inflation valve. Have technician loosen setscrew and gently move cap in an up and down motion to verify the sliplock is seated. Have technician align setscrew with the vertical groove on the inflation valve and retighten.



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NOTE

Ensure valve cap is cemented to plastic sleeve. Use polychloroprene adhesive (NIIN 00-142-9913) only.

Valves received from supply without spring clip are to be considered RFI. Spring clip is no longer required.

The LR-1 inflation valve FLU-6/P can be cocked on either of the two opposite flats on the cam head. When cocked on one of the flats after recharging, leakage may be possible because of a slightly asymmetrical cam head. After recharging the cylinder, submerge assembly in water, observe for bubbles from valve, then dry and store for 24 hours. After storage period check for proper weight. If no leakage, return assembly to service after ensuring valve cam is fully seated on flat. If leakage has occurred, recharge, recock on opposite flat and perform the above test for leakage. If no leakage, return assembly to service. If leakage has occurred again, return valve to supply.

19. Immerse inflation assembly in water tank.

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20. Check for leaks; then remove assembly from tank and dry with an air blast. Wipe assembly with a lint-free cloth.

NOTE

After storage period, inflation assembly should be checked for proper weight.

21. If required, re-mark tare weight, gross weight, charge weight on cylinder.

22. If inflation assembly is not to be installed, attach a red tag with the following instructions printed in ink: WARNING: WEIGH INFLATION ASSEMBLY BEFORE INSTALLING ON LIFERAFT. DO NOT INSTALL IMPROPERLY CHARGED CYLINDER.

4-43. REPAIR/REPLACEMENT.

4-44. This section contains instructions for the repair, replacement, modification or fabrication of various components or subassemblies of liferafts to ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for parts which are defective, corroded or worn and require replacement are included in the applicable paragraph of this section. Other replacement parts, such as carrying cases and personal survival equipment, are listed in the applicable table. All repairs shall be documented by making necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

4-45. Replacement of easily removed assembly components such as CO₂ inflation valves and survival items are authorized in addition to repair and replacement procedures documented in this section. The liferaft shall be subjected to a functional test and leakage test each time CO₂ inflation valves are removed and replaced for any reason, and each time inflation valve gaskets are replaced.

4-46. DETERMINATION OF REPAIRABILITY. Liferafts shall be considered beyond repair for any of the following reasons:

- 1. Porous fabric areas on tubes.
- 2. Split or open tube seams.
- 3. Leakage test failure resulting from other than cut, tear, or puncture.

4. Damaged, malfunctioning, excessively worn, or corroded inlet valve, manifold assembly or oral inflation tube, as applicable.

5. Extensively damaged floor.

6. Holes or abrasions exceeding 2 inches in length or diameter in pneumatic compartment.

7. Oral inflation or inlet valve stem separating from the fabric on the LR-1 liferaft.

8. Deterioration of the rubberized fabric caused by oil, grease, or any other foreign substance.

9. Deterioration of the rubberized fabric caused by a heavy mildewed condition.

10. Rips, tears, or punctures in the pneumatic compartments which exceed 2 inches.

11. In the judgement of a competent inspector, requiring excessive repair.

4-47. CEMENTING LIFERAFTS. All cementing of liferafts shall be performed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620 NIIN 00-243-9401

Materials Required

Quantity	Description	Reference Number
1	Brush, Disposable	A-A-289/H-B-643 NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone, (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589

WARNING

Do not use toluene or MEK near open flames, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if Toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Toluene or MEK must be applied vigorously to liferaft material over three years old in order to reactivate the material prior to cementing. Pigment from the material coloring staining a cloth rubbed over the treated surface will indicate the material has been reactivated. Adhesive shall be applied immediately after the surface has dried.

1. Clean both surfaces to be cemented together with four applications of toluene or MEK. Apply toluene or MEK with back-and-forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow areas to dry between applications.

CAUTION

Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LR-1 liferaft assemblies.

2. Prepare cement and accelerator mixture. Prepare only enough mixture for 8 hours, as this is the effective active period for the mixture. Dispose of any remaining mixture at this time.

3. Using a disposable brush, apply adhesive to completely cover surfaces to be cemented together. Use long one-directional strokes and complete each surface before adhesive becomes tacky as the brush may pull tacky adhesive from the surface. Allow to dry for ten minutes.

4. Apply a second coat of adhesive as in [step 3](#). Use brush strokes perpendicular to the original direction.

5. When second coat of adhesive has become tacky, place pieces together. If cemented area is a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden roller.

6. Allow adhesive to cure a minimum of 48 hours.

7. Dust area with talc.

4-48. PATCHING LIFERAFTS. To patch liferaft select color patch to approximately match and proceed as follows:

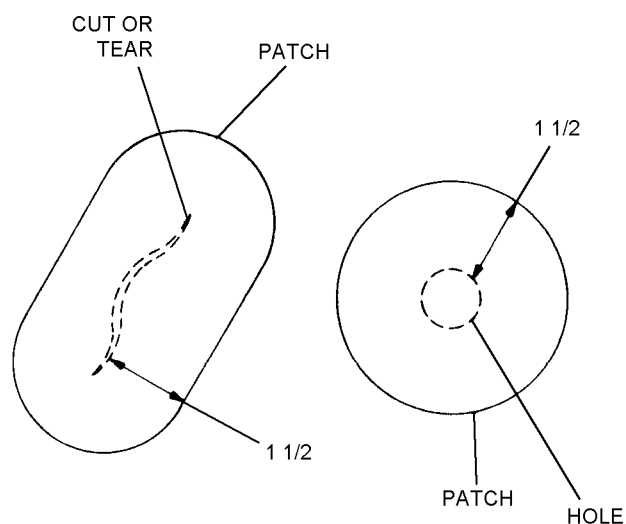
Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Nylon, Coated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009

CAUTION

Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LR-1 liferaft assemblies.

1. Cut a rounded patch 1 1/2 inches larger than the damage on all sides.



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- 2. Scallop edges of patch if it is larger than 5 inches in diameter.
- 3. If damaged area in floor is larger than 1 inch, patches shall be applied to both sides.
- 4. Center patch over damage and trace on outline of patch on fabric.
- 5. Cement patch to damaged area in accordance with [paragraph 4-47](#).
- 6. Dust area with talc.
- 7. Perform a leakage test.

4-49. RECEMENTING OR REPLACING SEAM TAPES. This repair shall be performed only if a flotation tube does not leak, that is, if only the outer seam tape is loose, or if the seam does not seal a flotation tube. To recement or replace a seam tape, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589

NOTE

- Seam separation in floors and seats may be repaired provided safety and flotation capabilities are not compromised. Exercise sound judgement in determining whether such repairs are within local capabilities. All cementing shall be performed in accordance with [paragraph 4-47](#).
- 1. If tape is present and undamaged, recement tape to liferaft.

- 2. If tape is missing, measure and fit a replacement tape to area and cement in place. Overlap other seams a minimum of 1 inch.



Do not use toluene or MEK near open flame, heat, or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Avoid excessive application of toluene or MEK on seams. Remove any spilled or excessive toluene or MEK immediately.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

- 3. If tape is damaged, peel damaged tape from liferaft. Apply toluene or MEK only as needed to loosen tape. Trim damaged tape and replace with new tape. Overlap other seam tape a minimum of 1 inch.
- 4. Perform leakage test ([paragraph 4-34](#)).

4-50. SEA ANCHOR/MOORING LINE REPLACEMENT. To replace worn or damaged sea anchor or mooring line, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
1	Sea Anchor, Type I, Size 1	MIL-A-3339
As Required	Cord, Nylon Type III	MIL-C-5040 NIIN 00-240-2146

1. (Complete Assembly Replacement) Secure free end of mooring line to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

2. (Mooring Line Replacement Only) Sear both ends of a 16-foot length of MIL-C-5040 Type III nylon cord. Secure one end to sea anchor bridle, and other end to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

4-51. INSPECTION RECORD PATCH.

NOTE

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life-rafts. The requirement for all other record documentation remains unchanged. The reason for this change is that most Inspection Record Patches are unreadable, and the packer's and inspector's names, including the type of inspection (leak/functional), are documented on Aviation Crew Systems Records.

4-52. FABRICATION OF ANTI-CHAFING DISC. To fabricate the anti-chafing disc, proceed as follows:

Materials Required

Quantity	Description	Reference Number
6 x 12 inches	Cloth, Nylon, Coated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009

1. Cut two 6-inch diameter discs from nylon life-raft cloth and cut a 1-inch diameter hole in center of each disc.

NOTE

Cement applications shall be performed in accordance with [paragraph 4-47](#).

2. Cement discs together and allow cement to dry.

4-53. FABRICATION OF RETAINING LINE. To fabricate the retaining line, proceed as follows (See [figure 4-10](#)):

Figure 4-9. Deleted

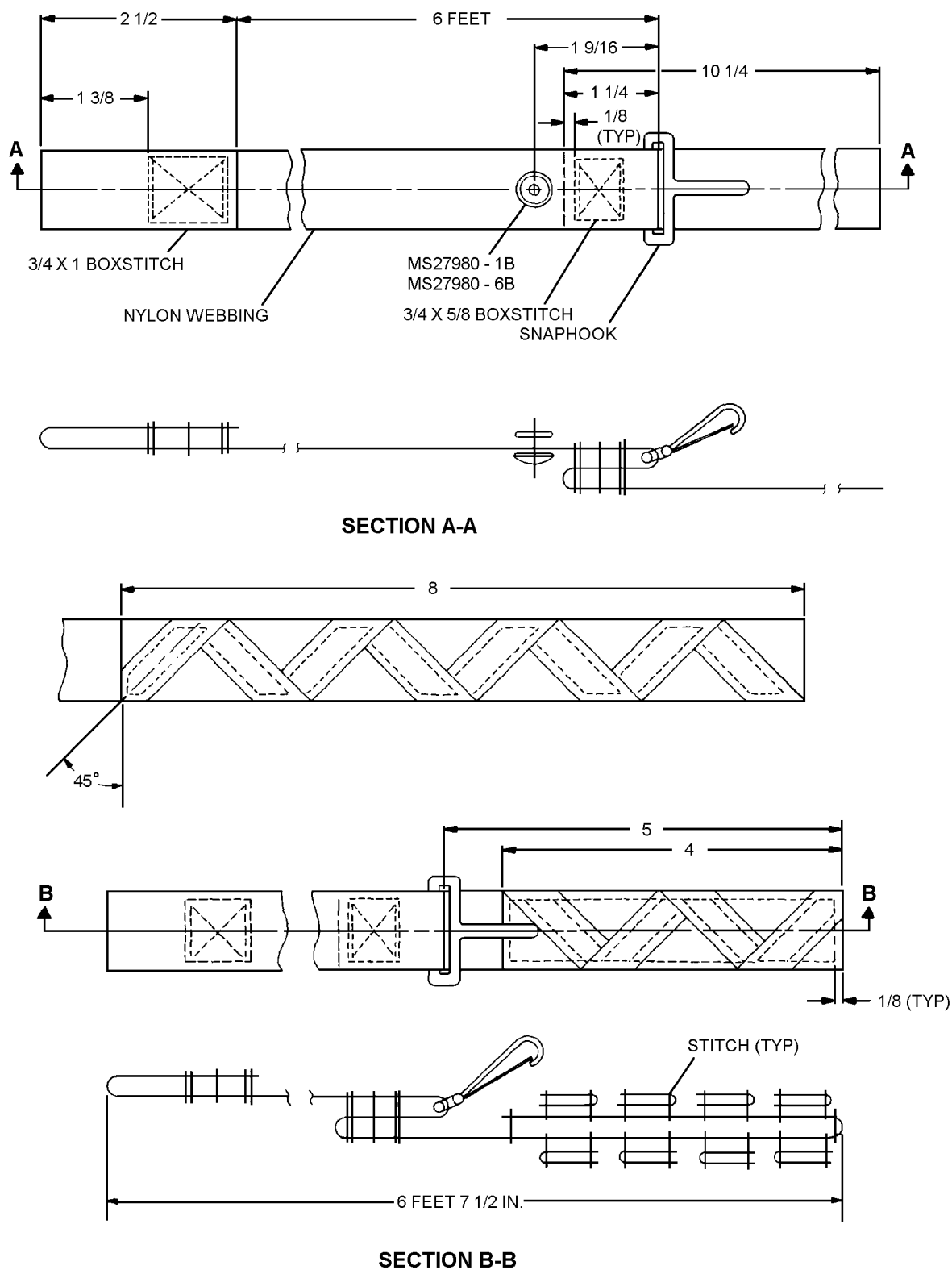


Figure 4-10. Webbing Retaining Line, Details

10040010

Support Equipment Required

Description	Reference Number
Chuck, Fastener	1410 (CAGE 83058)
Die, Fastener	1410 (CAGE 83058)
Chuck, Fastener	1412 (CAGE 83058)
Die, Fastener	1407 (CAGE 83058)
Press	M-100 (CAGE 83058)
Punch, 1/8-inch	

Materials Required

Quantity	Description	Reference Number
8 feet 4 1/2 inches	Webbing, Nylon, Type II, 1-inch, Yellow	MIL-W-4088
1	Cap, Snap Fastener	MS27980-1B
1	Socket, Snap Fastener	MS27980-6B
1	Stud, Snap Fastener	MS27980-7B
1	Eyelet, Snap Fastener	MS27980-8B
1	Snaphook	M43770/1-CWBC3
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

1. Cut 12 inches of webbing from the 8-foot 4 1/2-inch length. Sear ends of both pieces.

2. Position snaphook 11 1/2 inches from one end of longer piece of webbing. Fold webbing to dimensions shown in [figure 4-10](#), and stitch as shown using size E nylon thread (V-T-295, Type II), 8 to 10 stitches per inch. Backstitch minimum of 1/2 inch.

3. Install snap fastener.

4. Form a loop at other end of line by folding 2 1/2 inches from end of line. Boxstitch as shown.

5. Fold the 12-inch piece of webbing in half lengthwise, and sew to end of retaining line to provide reinforcement.

6. Fold reinforced webbing in half. Sew the 4-inch fold.

7. (For Use in High Speed Soft Pack). Install stud and eyelet (MS27980-7B, 8B) on upper flap of High Speed Soft Pack so that stud is on inside.

4-54. FABRICATION OF BOARDING HANDLE ASSEMBLY. To fabricate the boarding handle assembly, proceed as follows:

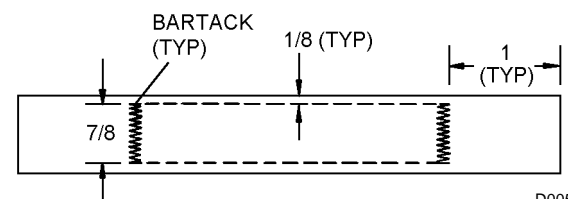
Materials Required

Quantity	Description	Reference Number
As Required	Webbing, Nylon, Type II	MIL-W-4088
As Required	Cloth, Nylon, Coated, Blue, Var. D	MIL-C-23070 NIIN 00-132-5009
As Required	Thread, Nylon, Type II	V-T-295 NIIN 00-204-3884

1. Cut two 9-inch pieces of nylon webbing for handle.

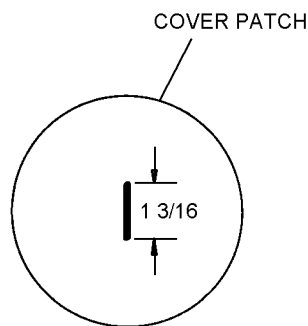
2. Cut two 3 1/2-inch diameter discs for cover patch and two 2 1/2-inch diameter discs for base patch from blue nylon raft cloth.

3. Stitch the two 9-inch lengths of webbing together, using size E nylon thread (V-T-295, Type II).



D0054003

4. On centerline of the two 3 1/2-inch cover patches make a slit 1 3/16 inches in length.

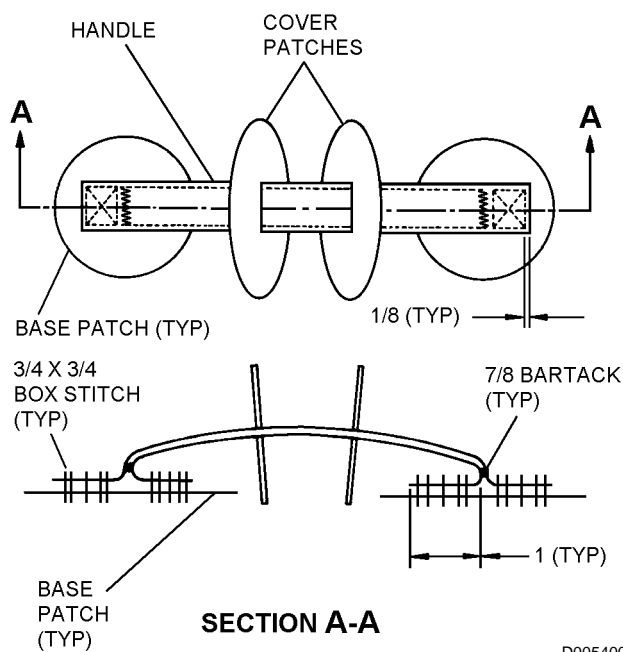


Step 4 - Para 4-54

D0054004

5. Insert handle through slit in each cover patch.

6. Separate ends of handle and stitch to each base patch.



SECTION A-A

Step 6 - Para 4-54

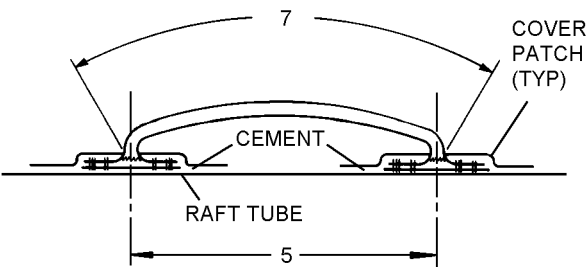
D0054006

NOTE

Cement applications shall be performed in accordance with [paragraph 4-47](#).

7. Inflate raft through oral inflation valve to 1 psig.

8. Position handle so that center of loop handle falls slightly below horizontal centerline of the inflated tube. Slide cover patches to ends of handle. Ensure that a 7-inch arc is present to facilitate grasp. Cement patches to raft tube.



Step 8 - Para 4-54

D0054008

4-55. REPLACEMENT OF SECURING LINE. To replace securing line, proceed as follows:

Materials Required

Quantity	Description	Reference Number
5 feet	Cord, Nylon, Type III	MIL-C-5040 NIIN 00-240-2146

NOTE

Securing line for the LR-1 liferaft is required in the standard soft pack, high-speed soft pack, and special soft pack.

1. Sear ends of 5-foot length of Type III nylon cord.

2. Insert one end of nylon cord through webbing loop on sea anchor mooring patch and secure with a bowline knot followed by an overhand knot.

3. (STANDARD AND SPECIAL SOFT PACKS) Ensure that free end is secured to raft container during packing with a bowline knot followed by an overhand knot.

4. (HIGH SPEED SOFT PACK) Ensure that free end is secured to the loop on the equipment container during packing with a bowline knot followed by an overhand knot.

5. Loop cord into 12-inch bights and secure with a rubber band.

4-56. REPLACEMENT OF MIL-V-25492 INFLATION VALVE WITH MIL-V-81722 (FLU-6/P) INFLATION VALVE (RSSK INSTALLATION ONLY). To replace the MIL-V-25492 inflation valve with the MIL-V-81722 inflation valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Inflation Valve	MIL-V-81722

1. Remove raft from Rigid Seat Survival Kit.

WARNING

Gas under pressure. Do not remove inflation valve from a charged cylinder.

2. Remove inflation assembly from raft, discharge inflation assembly, and remove MIL-V-25492 inflation valve from cylinder.

3. Remove and discard plastic dust cap on MIL-V-81722 inflation valve inlet. Do not discard copper gasket under dust cap.

4. Place copper gasket on cylinder neck, thread MIL-V-81722 inflation valve onto cylinder, and tighten to a torque of 65 to 70 ft-lb.

5. Recharge inflation assembly in accordance with [paragraph 4-42](#).

4-57. INSTALLATION OF HOOK TAPE ON CYLINDER SLING (HELO BACK PACK). To install hook tape on cylinder sling, proceed as follows:

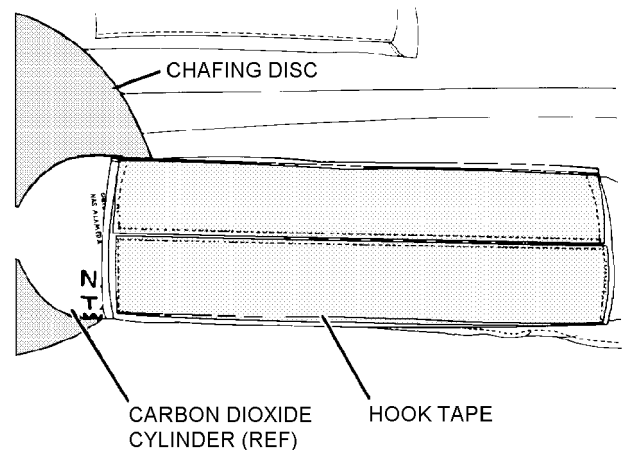
Materials Required

Quantity	Description	Reference Number
12 inches	Tape, Hook, Type II, Black, 1 inch	MIL-F-21840 NIIN 00-795-1087
2 1/4 x 6 1/2 inches	Cloth, Nylon, Coated	MIL-C-23070 NIIN 00-086-5829

1. Cut 12-inch length of hook tape into two 6-inch pieces.

2. Sew each 6-inch piece of hook tape to 2 1/4- by 6 1/2-inch piece of nylon raft cloth.

3. Cement patch to cylinder sling.



D0057003

Step 3 - Para 4-57

4-58. MODIFICATION OF THE LR-1 HELO BACK PACK CO₂ INFLATION SYSTEM. To modify Helo Back Pack CO₂ inflation system equipped with a MIL-V-81722 (FLU-6/P) inflation valve, proceed as follows:

Materials Required

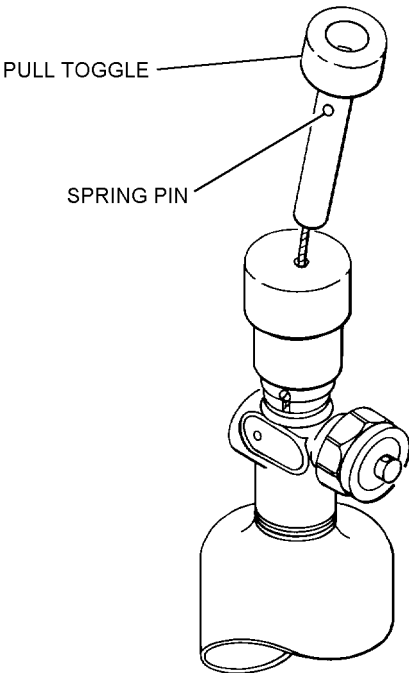
Quantity	Description	Reference Number
As Required	Ink, Black, Waterproof	SPE-92 NIIN 00-161-4229
As Required	Thread, Nylon, Size E	V-T-295 NIIN 00-204-3884
1	Grommet, Type III No. 1	NIIN 00-231-6619

1. Remove CO₂ inflation system (MIL-V-81722) from liferaft. Remove retaining line from inflation assembly.



Clamp the CO₂ inflation assembly in a suitable restraining device (vise) when removing the spring pin from the valve pull toggle.

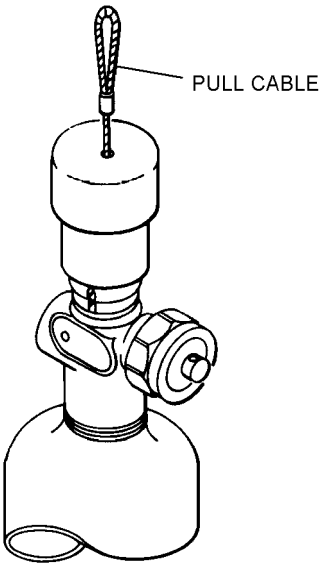
2. Extract spring pin from pull toggle shaft.



Step 2 - Para 4-58

D0058002

3. Remove and scrap pull toggle. Do not remove valve pull cable.



D0058003

Step 3 - Para 4-58

4. Remark new CO₂ inflation assembly tare and gross weights. New weights should be old weights minus 0.03 lb (weight of plastic pull toggle).

5. Mark retaining line at 15 1/2 inches and 16 1/2-inches from the loop end of the line.

6. Fold line at 15 1/2-inch mark, then refold snaphook portion of line back at 16 1/2-inch mark. This will result in three thicknesses of line at 14 1/2 to 15 1/2 inches from loop end.

7. Sew a one-inch boxstitch through the three thicknesses of line.

NOTE

An alternate method of providing three thicknesses of line is to boxstitch two 1-inch lengths of MIL-W-4088, Type II webbing to the retaining line between 14 1/2 and 15 1/2-inch mark (measured from the loop end of retaining line).

8. Install grommet in center of boxstitch.

9. Reinstall CO₂ inflation assembly on liferaft.

10. Pass loop end of retaining line around modified MIL-V-81722 (FLU-6/P) inflation valve at cylinder neck. Pass snaphook end of line through the loop and pull line tight, forming a lark's head knot. Tack lark's head knot with two turns of waxed, nylon 6-cord, single. Tie ends with a surgeon's knot followed by a square knot.

11. Remove and scrap the red arrow patch, with stenciled note "Pull Toggle" from the life raft carrying case.

12. Stencil or print the following note in 1-inch high letters on the carrying case top panel: "PULL YELLOW 6 FT. LANYARD TO INFLATE: CLIP SNAPHOOK TO SELF."

13. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

4-59. MODIFICATION OF THE LR-1 LIFERAFT FLU-6/P TYPE INFLATION VALVE ON RSSK INFLATION SYSTEMS. To modify the LR-1 liferaft inflation assembly equipped with a MIL-V-81722 (FLU-6/P) inflation valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Black, Waterproof	SPE-92 NIIN 00-161-4229

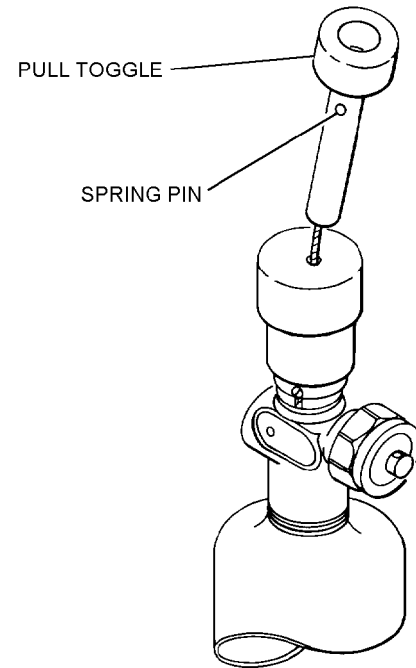
1. Remove the LR-1 liferaft, if stowed.

2. Disconnect and remove the CO₂ inflation assembly (valve and cylinder) from the liferaft. Remove retaining line from inflation assembly.

WARNING

Clamp the CO₂ inflation assembly in a suitable restraining device (vise) when removing the spring pin from the valve pull toggle.

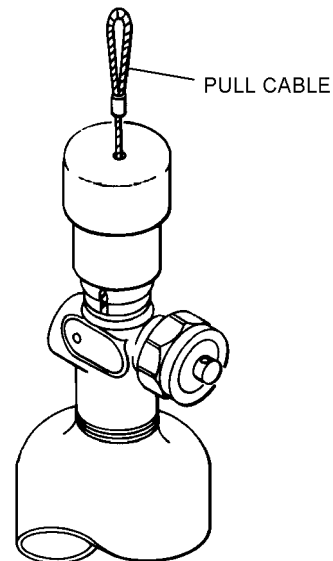
3. Extract and scrap the spring pin from the pull toggle shaft.



D0059003

Step 3 - Para 4-59

4. Remove and scrap the pull toggle. Do not remove the valve pull cable.



D0059004

Step 4 - Para 4-59

NAVAIR 13-1-6.1-1

5. Re-mark the new CO₂ inflation assembly tare and gross weights. New weights should be old weight minus 0.03 lb (weight of plastic pull toggle).

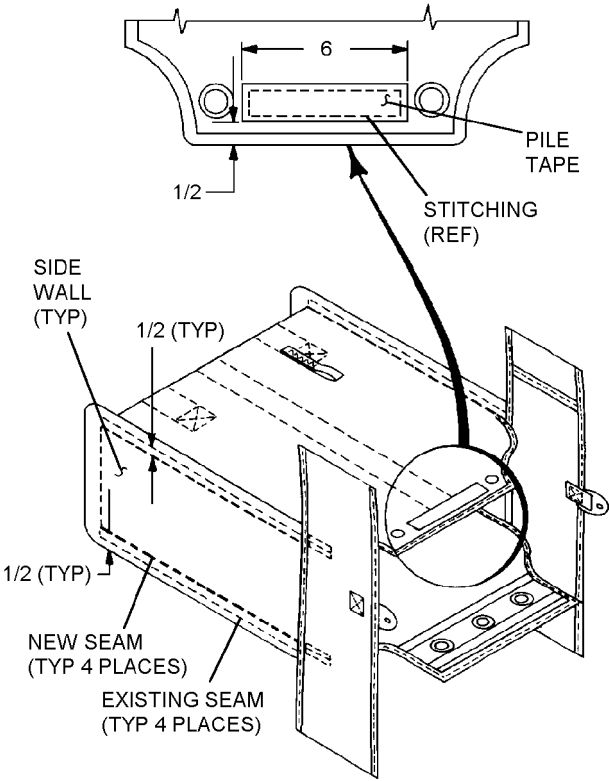
6. Reinstall inflation assembly on liferaft.

7. Rerig and reinstall liferaft in accordance with NAVAIR 13-1-6.3-1 and 13-1-6.3-2 instructions.

NOTE

To preclude tension on the CO₂ valve pull cable, allow slack in the dropline while packing raft.

4-60. MODIFICATION OF HIGH SPEED SOFT PACK AND LIFERAFT CYLINDER SLING. To modify the high speed soft pack and cylinder sling for use in T-39 type aircraft, proceed as follows:



D0060002

Step 2 - Para 4-60
NOTE

Cementing procedure shall be performed in accordance with the general instructions of [paragraph 4-47](#).

3. Cement 6-inch length of hook tape to carbon dioxide cylinder sling on liferaft so pile tape engages hook tape when liferaft is stowed in container.

4-60A. REPAIR OF HELICOPTER LIFERAFT (LR-1) CARRYING CASE. To repair the liferaft carrying case proceed as follows:

Materials Required

1. Remove contents from high speed outer container. Turn container inside out.

2. Sew new side wall seams 1/2 inch from existing side wall seams using 8 to 10 stitches per inch. Turn container right side out and hand sew 6-inch pile tape to inside of cone side flap as shown. Use whipstitch 8 to 10 stitches per inch.

Quantity	Description	Reference Number
As Required	Thread, Nylon, Type I or II, Size E	V-T-295
As Required	Cloth	MIL-C-81543

1. Tears of less than 1 inch shall be darned or repaired with a zigzag stitch.

2. Tears of 1 to 6 inches shall be covered with a patch.

3. Broken stitching shall be repaired by over-stitching 2 inches past the ends of the broken stitches and shall be back-stitched 1 inch.

4. Tears of over 6 inches shall not be repaired.

4-61. REPLACEMENT OF ORAL INFLATION VALVE. To replace the oral inflation valve, proceed as follows:

NOTE

Replacement oral inflation valves can only be obtained through salvage of BCM'ed or surveyed inflatable survival equipment.

Materials Required		
Quantity	Description	Reference Number
1	Valve, Oral Inflation	—
As Required	Cement, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Brush, Disposable	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762

CAUTION

Only toluene or MEK shall be used to clean oral inflation valve and tube. Only Polychloroprene cement (MIL-T-5540, NIIN 00-142-9913) shall be used to cement oral inflation valve into oral inflation tube.

1. Carefully cut through metal clamp securing oral inflation valve to oral inflation tube and remove the metal band and oral inflation valve.

2. If the tip of the oral inflation tube was damaged during removal of valve, trim off damaged section.

3. Clean both surfaces to be cemented with toluene or MEK. Allow areas to dry.

4. Using a small disposable brush, carefully apply a small amount of Polychloroprene cement to the surfaces of the tube and the valve which are to be cemented together.

5. Immediately place oral inflation valve into oral inflation tube. Oral inflation valve should be inserted up to valve shoulder. Inspect for proper application and cementing.

6. Tightly wrap the cemented portion of the oral inflation tube with cord or wire and allow to cure for 48 hours before removing wrap.

7. Perform leakage test in accordance with [paragraph 4-34](#).

4-62. PACKING LR-1 LIFERAFT.

4-63. This procedure contains information on packing the LR-1 in the Helicopter Back Pack. Information on packing the LR-1 in the Combination Carrying Case and Equipment Container (used in Standard and Special Soft Packs, High Speed Soft Pack (Modified)) and RSSK assemblies can be found in NAVAIR 13-1-6.3-1. [Table 4-8](#), LR-1 Liferaft Assemblies, lists the LR-1 Liferaft components used on various survival kit and pack assemblies. Packing of the LR-1 liferaft shall be carried out by qualified personnel at the lowest level of maintenance possible.

4-64. PACKING LR-1 LIFERAFT WITH MODIFIED MIL-V-81722 (FLU-6/P) INFLATION VALVE IN HELICOPTER BACK PACK (LR-1 HELO MOD). To pack an LR-1 liferaft with modified MIL-V-81722 (FLU-6/P) inflation valve in a Helicopter Back Pack, proceed as follows:

1. Ensure liferaft and carrying case have been inspected in accordance with [paragraph 4-13](#).

2. Lightly dust entire liferaft assembly with talc (MIL-T-50036A).

3. If necessary, stow sea anchor (see [figure 4-11](#)).

4. Deploy weathershield and lay out neatly over top of liferaft.

5. Pass loop end of retaining line around modified MIL-V-81722 (FLU-6/P) inflation valve at cylinder neck. Pass snaphook end of line through the loop and pull knot tight, forming a lark's head knot. Tack lark's head knot with two turns of waxed, nylon 6-cord, single. Tie ends with a surgeon's knot followed by a square knot.

Table 4-8. LR-1 Liferaft Assemblies

Component	Reference Number	LR-1 Applications					
		Standard Soft Pack	High Speed Soft Pack	Rigid Seat Survival Kit	Helicopter Back Pack	Special Assembly	High Speed Soft Pack Modified
		SSP	HSSP	RSSK	HELO	SPECIAL	HSSP MOD
Inflatable One-Man Liferaft	67A318H2-1 (CAGE 30003)	X	X	X	X (Note 1)	X	X (Note 2)
Inflation Valve	FLU-6/P (CAGE 30003)	X	X	-	-	X	X
	FLU-6/P (CAGE 30003) Modified	-	-	X	X	-	-
CO ₂ Cylinders	MS26545B2C0020 (CAGE 96906) or MS26545B4C0020 (CAGE 96906) or MS26545B4C0021 (CAGE 96906) or						
SSP Outer Container	68A77D2-1 (CAGE 30003)	X	-	-	-	-	-
HSSP Outer Container	60A116E4 (CAGE 30003)	-	X	-	-	-	X (Note 3)
Survival Package Assembly	472P510E400-1 (CAGE 24632)	-	-	-	-	-	-
Helo Carrying Case	P/N 68A77H1-1 (CAGE 30003)	-	-	-	X	-	-
Special Outer Container	P/N 134F10234-7 (CAGE 26512)	-	-	-	-	X	-
Combination Carrying Case and Equipment Container	P/N 67A77H3-1 (CAGE 30003)	X	-	-	-	X	-
Securing Line (Note 4)	MIL-C-5040 Type III	X	X	-	-	X	-
Retaining Line (Note 5)	P/N 67A319D16 (CAGE 30003)	X	X	X	X	X	X
Survival Items (Note 6)	NAVAIR 13-1-6.5 Rescue and Survival Equipment	X	X	X	-	X	X
Sea Anchor	P/N 67A318H2-13 (CAGE 30003)	X	X	X	X	X	X

Table 4-8. LR-1 Liferaft Assemblies (Cont)

Component	Reference Number	LR-1 Applications					
		Standard Soft Pack	High Speed Soft Pack	Rigid Seat Survival Kit	Helicopter Back Pack	Special Assembly	High Speed Soft Pack Modified
		SSP	HSSP	RSSK	HELO	SPECIAL	HSSP MOD
Sea Anchor	P/N 67A318H2-13 (CAGE 30003)	X	X	X	X	X	X
<p>LEGEND: X Required On (One type of either item required) - Not Required</p> <p>Notes: (1) Hook tape must be added. Refer to paragraph 4-57. (2) Hook tape must be added. Refer to paragraph 4-60 and NAVAIR 13-1-6.3-1 and 13-1-6.3-2. (3) High Speed Soft Pack (Modified) must be fabricated. Refer to paragraph 4-60. (4) Securing line must be added. Refer to paragraph 4-55. (5) Retaining line must be added. Refer to paragraph 4-53. (6) Refer to applicable chapters in NAVAIR 13-1-6.3-1 and 13-1-6.3-2.</p>							

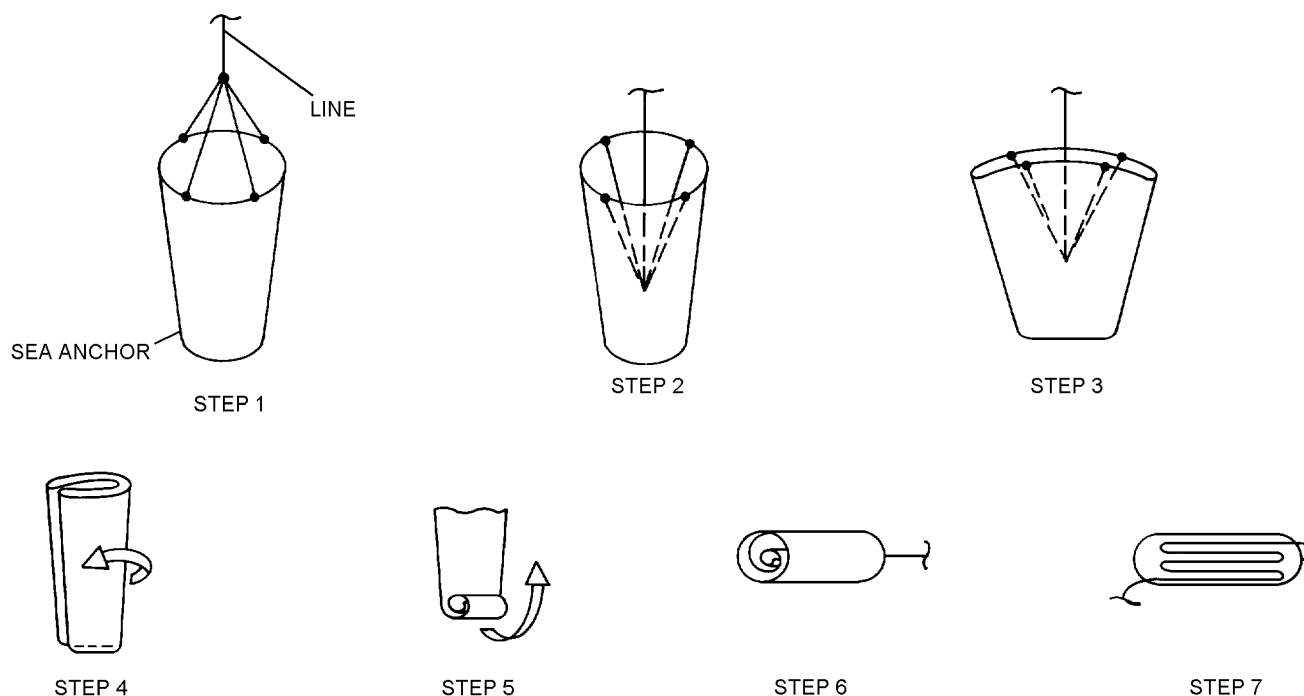


Figure 4-11. Stowing Sea Anchor and Line

10040011

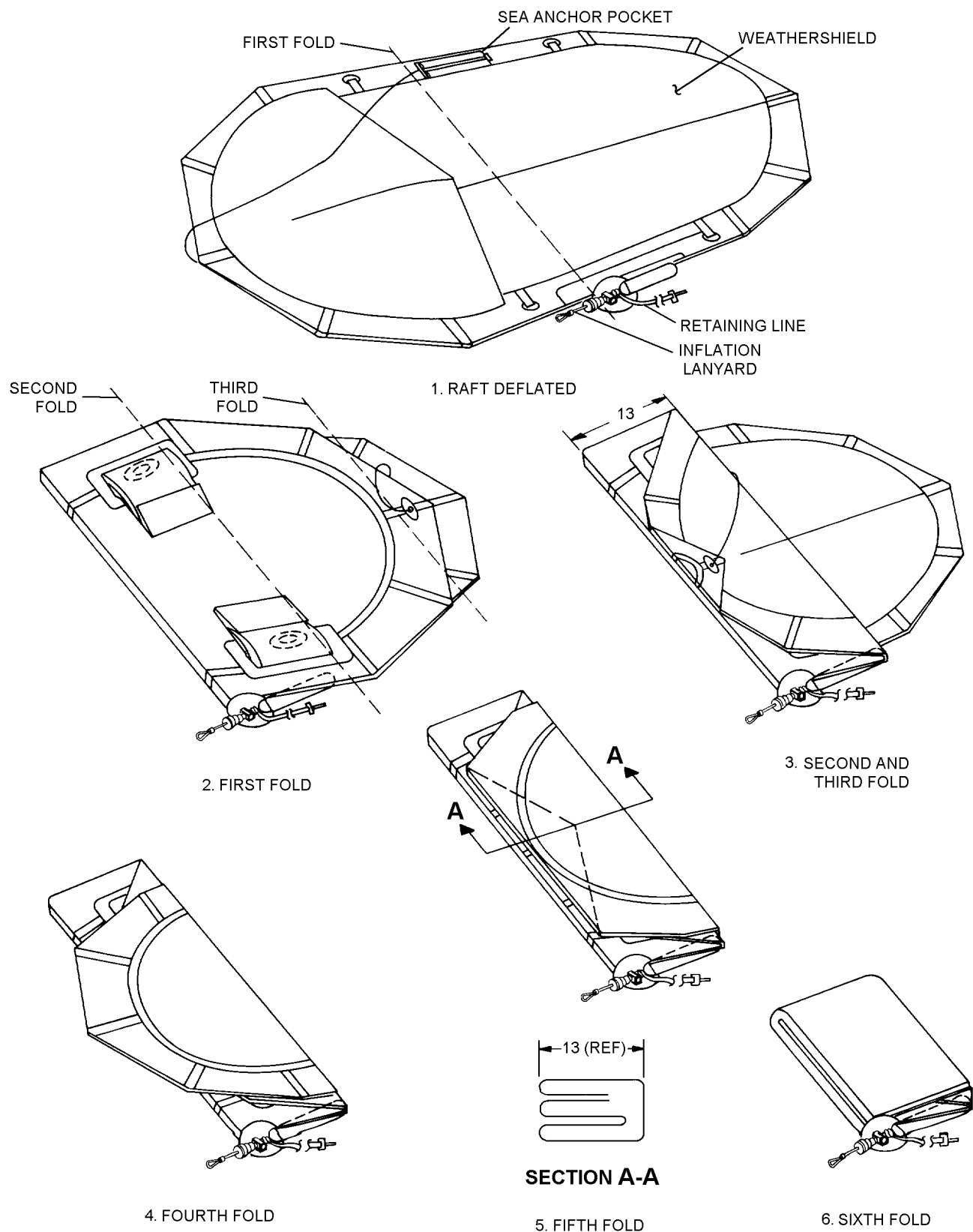


Figure 4-12. Folding LR-1 for Helicopter Back Pack

10040012

6. Fold anti-chafing disc around the inflation valve. Ensure oral inflation valve is locked.

7. Fold liferaft in accordance with [Figure 4-12](#).

8. Pass 12-inch length of MIL-V-5040, Type I nylon cord through modified inflation valve pull cable loop and grommet in retaining line. Tie cord with surgeon's knot followed by a square knot, pulling cable loop and grommet tightly together. Cut excess cord and sear ends.

WARNING

Retaining line must have a minimum of three inches slack between lark's head knot around carbon dioxide cylinder and pull cable loop tie-down when retaining line is pulled sufficiently to place tension on the pull cable. This slack is necessary to ensure actuation of the inflation assembly when the retaining line is pulled.

9. Fake the retaining line in 6-inch bights. Secure the line with a rubber band.

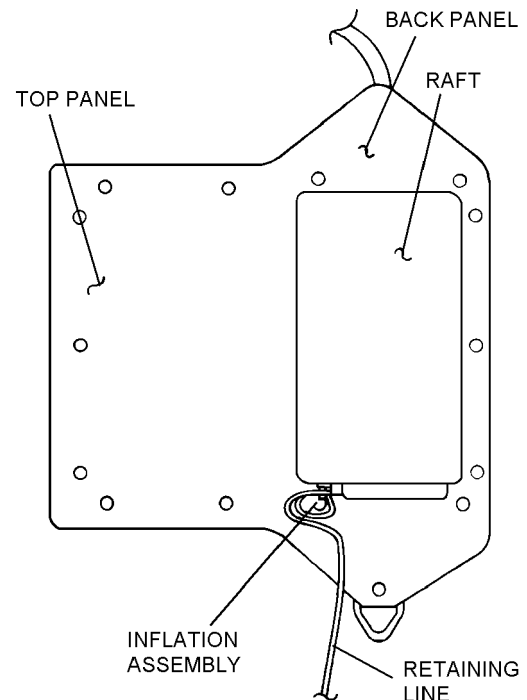
10. Place the carrying case on the table so that panels are open and the inside is facing up.

11. Place folded liferaft on the carrying case back panel so that inflation valve pull cable is toward centerline.

12. Secure the snap fastener on end of retaining line to mating fastener on lower end of back panel. Safety tie the retaining line snaphook to the grommet in lower panel with two turns of V-T-295, size E, single nylon thread. Tie ends with surgeon's knot, followed by a square knot.

13. Place remaining portion of the retaining line under the CO₂ cylinder. Ensure that the inflation valve pull cable is bent inboard.

14. Mate hook tape on cylinder sling with pile tape on lower flap.



D0064011

Step 11 - Para 4-64

15. Place protective flaps over the raft.

16. Fold top panel over the back panel and raft. Secure all snap fasteners and hook and pile tapes.

17. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

Section 4-4. Illustrated Parts Breakdown (IPB)

4-65. GENERAL.

4-66. This section lists and illustrates the assemblies and detail parts associated with the LR-1 Liferaft Assembly.

4-67. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

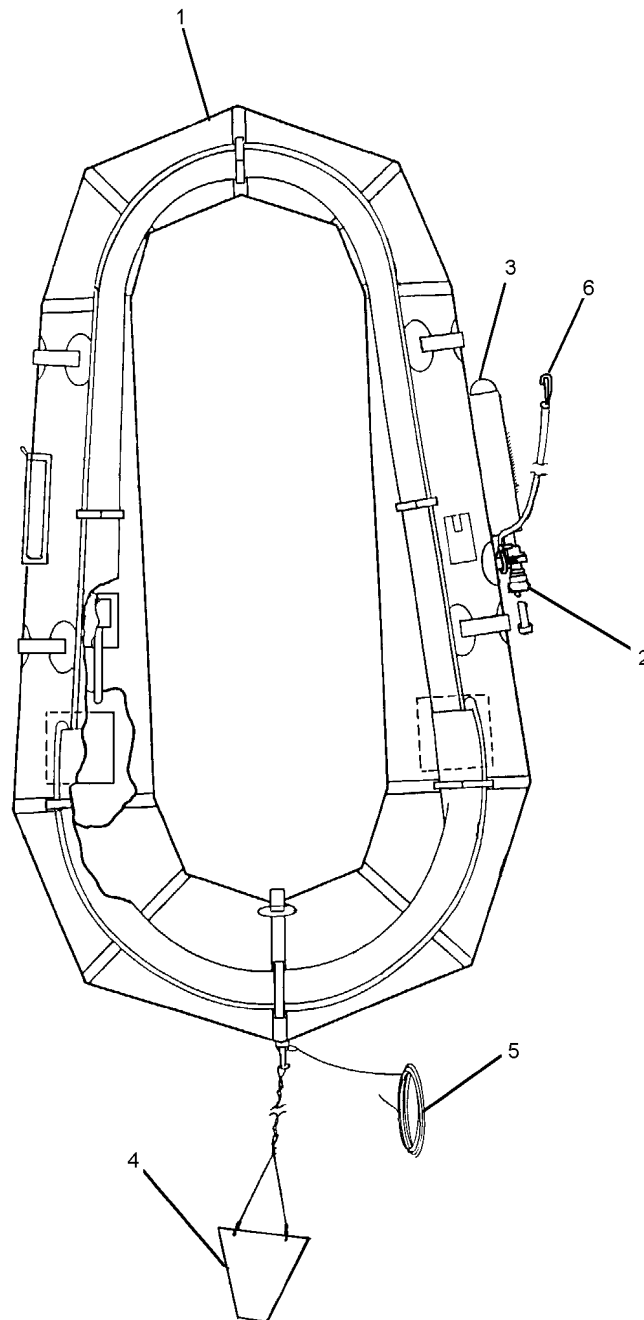


Figure 4-13. LR-1 Liferaft Illustrated Parts Breakdown

10040013

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
4-13		LR-1 LIFERAFT ASSEMBLY	REF	
-1	67A318H2-1	INFLATABLE ONE-MAN LIFERAFT	1	
-2	FLU-6/P	. INFLATION VALVE	1	
-3	MS26545B2C0020	. CO ₂ CYLINDER	1	
	MS26545B4C0020	. CO ₂ CYLINDER	1	
	MS26545B4C0021	. CO ₂ CYLINDER	1	
-4	67A318H2-13	. SEA ANCHOR	1	
-5	MIL-C-5040 TYPE III	. SECURING LINE	1	
-6	67A319D16	. RETAINING LINE	1	

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
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FLU-6/P	4-13-2	
MIL-C-5040	4-13-5	PAOZZ
MS26545B2C0020	4-13-3	PAOZZ
MS26545B2C0020	4-13-3	PAOZZ

Part Number	Figure and Index Number	SM&R Code
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MS26545B2C0021	4-13-3	PAOGG
67A318H2-1	4-13-1	PAOGG
67A318H2-13	4-13-4	PAOZZ
67A319D16	4-13-5	PAOZZ

CHAPTER 5

LRU-23/P LIFERAFT ASSEMBLY

Section 5-1. Description

5-1. GENERAL.

5-2. The LRU-23/P Liferaft Assembly (figure 5-1) is intended for the use of aircrew personnel and is stowed in individual seat survival kits. The LRU-23/P is designed to accommodate one person and provide insulation against low sea and air temperatures. The LRU-23/P is manufactured by RFD Ltd (CAGE Z2110) and is supplied by Martin-Baker Ltd (CAGE U1604).

5-3. CONFIGURATION.

5-4. The three main components of the liferaft are flotation chamber, double layer floor, and double layer canopy. The components are constructed of dark blue single ply polyurethane coated nylon fabric and are assembled using radio frequency welding techniques. This type of fabric and construction reduces the weight and bulk of the liferaft which enhances its adaptability for use in seat survival kits.

5-5. FLOTATION CHAMBER. (Figure 5-2.) The flotation platform of the raft consists of two fabric panels joined to form the flotation chamber. The floor and canopy are welded to the chamber to complete the basic structure of the liferaft. Installed components of the chamber are:

1. CO₂ inflation assembly (CO₂ cylinder and inlet valve).
2. Oral (top-off) inflation tube.
3. Boarding handles (4).
4. Sea anchor patch and sea anchor stowage.
5. Stern loop patch.
6. Raft retaining lanyard stowage pocket.

7. CO₂ cylinder pocket.

8. Equipment stowage pocket.

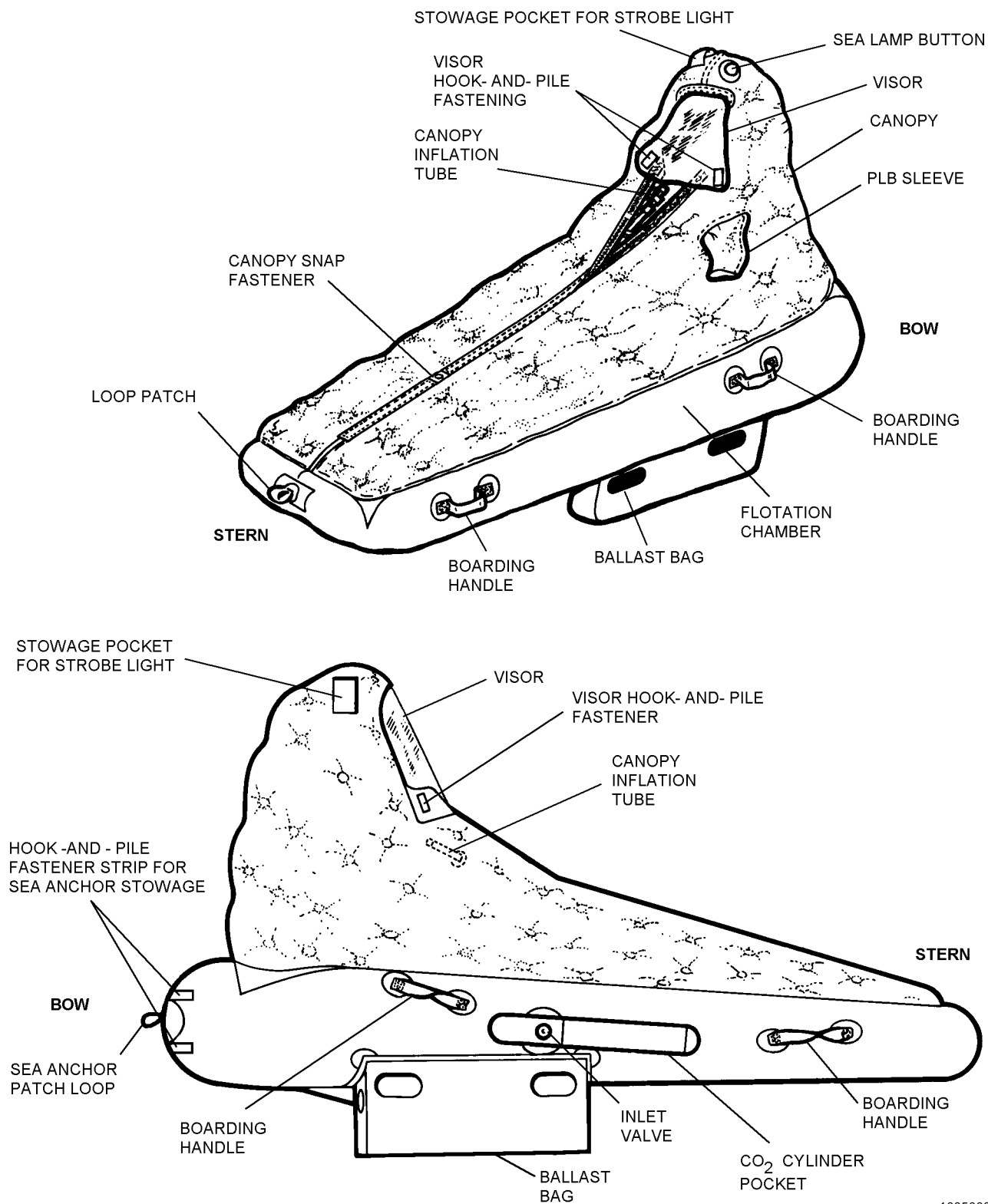
9. Hook-and-pile fastener patches (6) (secures canopy in stowed position).

10. Ballast bags (2).

5-6. FLOOR. (Figure 5-2.) The floor consists of two panels of single ply nylon fabric uniformly separated and held together by regularly spaced circular spacers. When welded together along the edges, the joined panels become an air-containing floor. The floor is inflated orally via an oral inflation valve. Items which are attached to or form part of the floor assembly are:

1. Integral bailer.
2. Liferaft identification markings.
3. Floor oral inflation tube.
4. Floor loop patch.
5. Righting handle.

5-7. CANOPY AND HOOD. (Figure 5-1.) The canopy and hood are constructed of two layers of nylon fabric joined together by circular patches in a manner similar to the floor. The canopy and hood are inflated orally via an inflation tube and valve located near the right shoulder. An opening which extends from the hood down the front center of the canopy to the stern affords access to and egress from the liferaft when the canopy and hood are in position. The opening is secured by hook-and-pile fastener and a snap-fastener strap. In its stowed configuration, the canopy is folded and held in place by six hook-and-pile fasteners secured to the bottom of the flotation chamber. When the canopy is rolled back, the liferaft is immediately ready for boarding when inflated. The hood is equipped with a transparent visor which is secured in position by two hook-and-pile patches attached to the lower corners of the visor. These



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Figure 5-1. LRU-23/P Liferaft Assembly

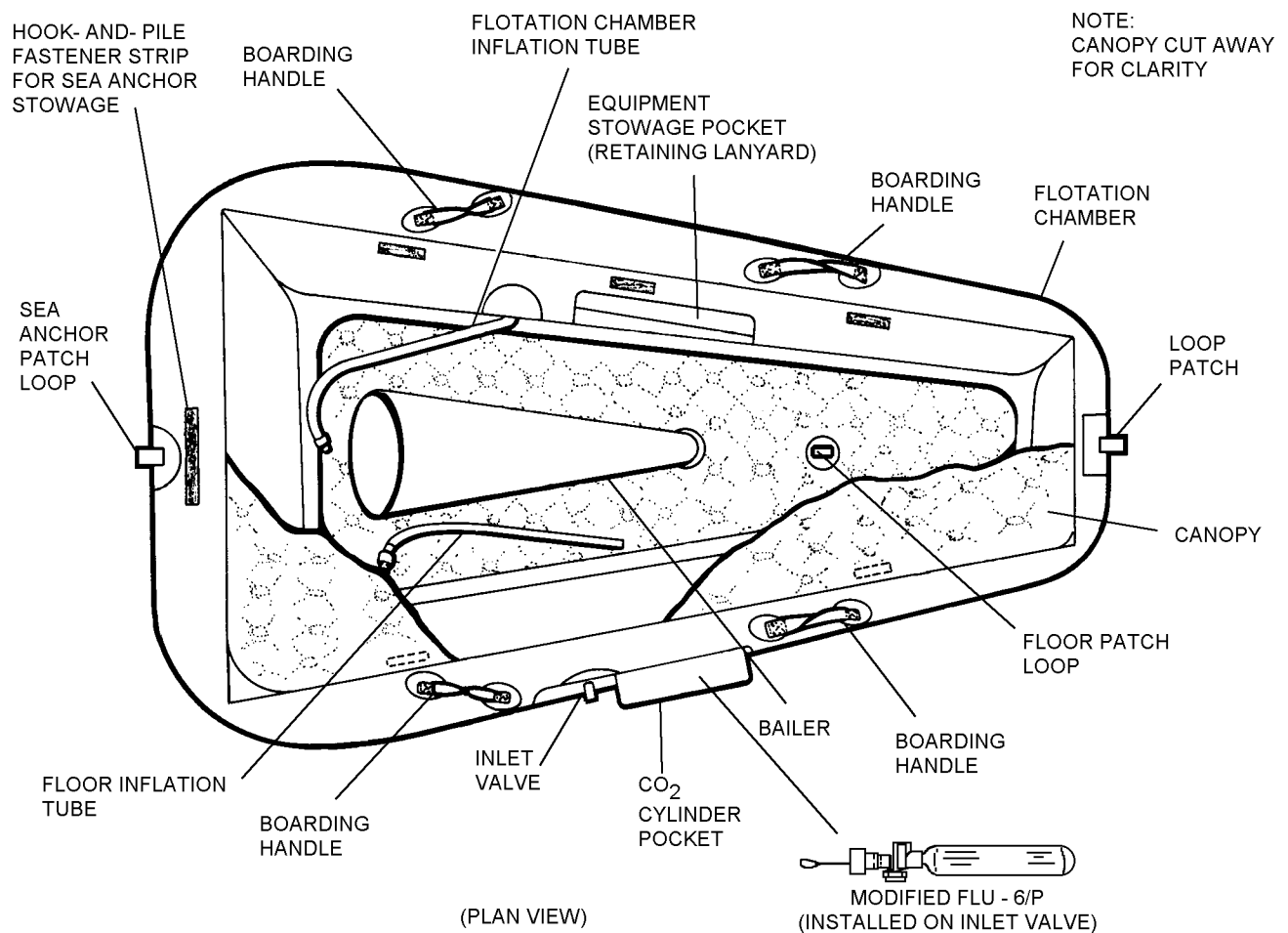


Figure 5-2. LRU-23/P Liferaft Assembly Components and Parts (Sheet 1 of 2)

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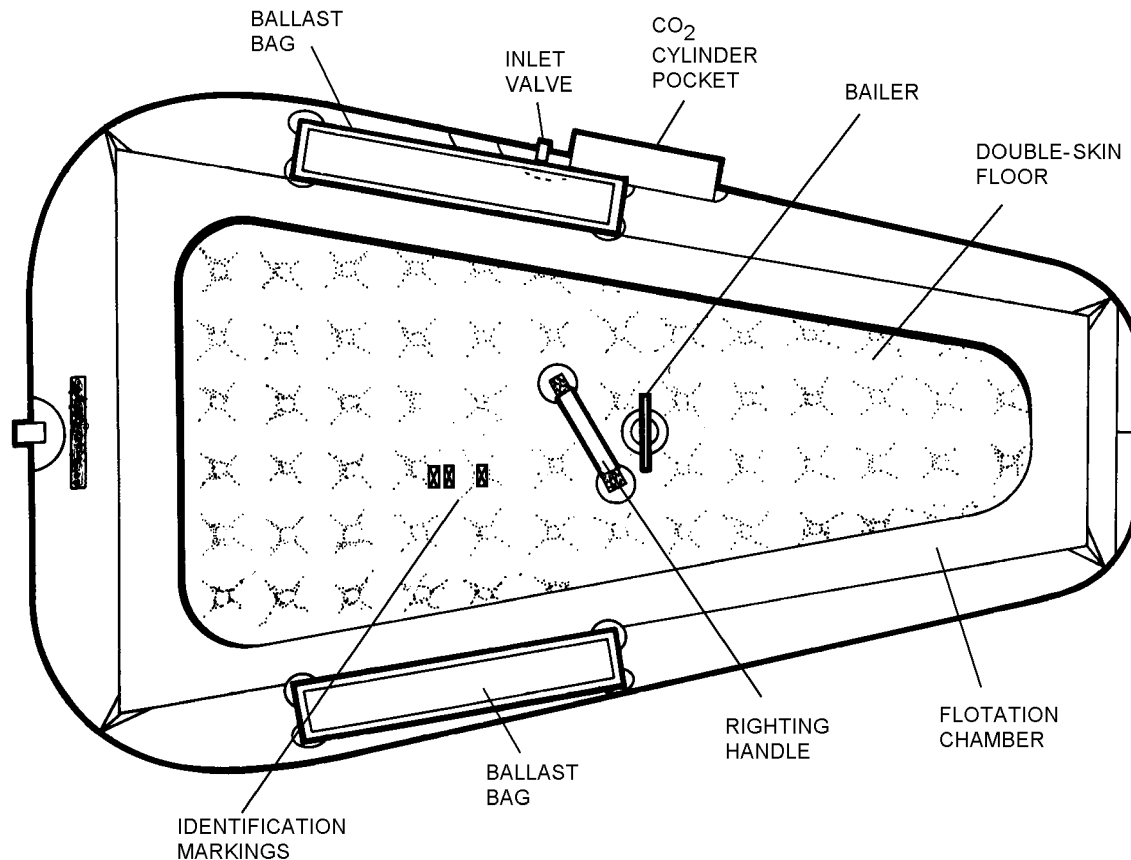


Figure 5-2. LRU-23/P Liferaft Assembly Components and Parts (Sheet 2)

1005B002

patches mate with two patches attached to the canopy hood at the neck. The following items are attached to or form a part of the canopy and hood assembly:

1. Sea lamp button.
2. Stowage pocket for strobe light.
3. Canopy inflation tube.

5-8. LIFERAFT AUXILIARY EQUIPMENT. Liferaft auxiliary equipment (stowed in equipment pocket) consists of:

1. Liferaft retaining lanyard.

2. Sea anchor attached to the sea anchor patch loop at the bow-end of the raft.

5-9. APPLICATION.

5-10. The LRU-23/P Liferaft Assembly is installed in seat survival kits used in F-14, F/A-18, and T-45 aircraft equipped with SJU-17(V)1/A through SJU-17(V)6/A ejection seats. Refer to NAVAIR 13-1-6.3-2 for details of application.

5-11. FUNCTION.

5-12. If survival kit deployment is manually actuated during parachute descent, the rucksack will fall away extracting the liferaft and dropline. When the liferaft reaches the end of free-fall, the initial line stretch snubbing action will actuate the liferaft's CO₂ inflation assembly. The rucksack containing the basic survival items will be suspended below the inflated liferaft and act as a sway stabilizer during descent.

5-13. On entering the water, the liferaft retaining lanyard is removed from its stowage pocket on the raft and attached to a D-ring on the survivor's life preserver. After removing survival radio, the seat kit lid is then released, the liferaft is boarded from the stern using boarding handles, and the rucksack is retrieved.

5-14. If the survival kit is retained until after water entry, actuation of the manual deployment handle on the seat kit will release the rucksack. The liferaft may then be inflated by manually pulling on the dropline attached to the raft CO₂ inflation assembly.

Section 5-2. Modifications

5-15. GENERAL.

5-16. There are no authorized modifications to the LRU-23/P Liferaft Assembly at this time. Common repairs and fabrications are listed in [table 5-1](#).

Table 5-1. LRU-23/P Common Repairs and Fabrications

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	5-51
Cementing Liferafts	5-52
Patching Liferafts	5-54
Recementing or Replacing Seam Tapes	5-55
Sea Anchor/Mooring Line Replacement	5-56
Fabrication of Anti-Chafing Disc	5-58
Modification of the FLU-6/P Inflation Valve	5-59
Replacement of Oral Inflation Valve	5-60
Repair and Reinforcement of Oral Inflation Tube Bonding Points	5-60A

Section 5-3. Maintenance

5-17. GENERAL.

5-18. This section contains instructions for disassembly, inspection, testing, repair, and assembly of the LRU-23/P Liferaft Assembly. All maintenance actions shall be recorded on appropriate maintenance records in accordance with OPNAVINST 4790.2 Series.

5-19. All maintenance shall be performed in a work area having a stable moderate temperature, ideally not less than 68°F (20°C). The area shall also be free of drafts and direct sunlight and have a smooth-top table free of snags, splinters, and rough surface. There shall be sufficient space to ensure inflated rafts are kept clear of heating equipment, rough surfaces, and other objects capable of causing damage to the raft.

5-20. INSPECTION.

5-21. All liferaft assemblies shall be subjected to the following inspections: Place-In-Service, Daily/Pre-Flight, Special, Phase/Isochronal Scheduled Inspection System and Acceptance Inspections.

5-21A. The Place-In-Service shall be performed on all new assemblies, or assemblies being returned from vendor repair or overhaul. The Aircraft Intermediate Maintenance Department performs this inspection.

5-21B. The Daily/Preflight inspection shall be performed on aircraft-installed liferafts in accordance with aircraft MRC requirements.

NOTE

Refer to NAVAIR 13-1-6.3-2, Seat Survival Kits, for inspection requirements for Seat Survival Kits.

5-22. All liferafts shall be subjected to the Calendar/Phase Inspection prior to placing in service or, if an aircraft inventory item, at the time of the aircraft Acceptance Inspection. Thereafter, the Calendar/Phase Inspection interval shall coincide with the aircraft inspection cycle in which they are installed. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 735 days. Unless operational requirements demand otherwise, the liferaft Calendar/Phase

Inspection shall be performed by intermediate level of maintenance or above.

NOTE

A functional test and pull cable proof load test shall be performed prior to placing in service or during aircraft Acceptance Inspection, and each fourth inspection cycle thereafter. A leakage test shall be performed at each inspection cycle. If inspection indicates damage beyond capability of maintenance, complete applicable forms in accordance with OPNAVINST 4790.2 Series and forward entire assembly to supply. Refer to [paragraph 5-51](#) for determination of repairability.

5-23. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

5-24. ACCEPTANCE/CALENDAR/PHASE INSPECTION. The Acceptance/Calendar/Phase Inspection consists of the following major tasks (to be performed in the order listed):

1. Container/Case Inspection
2. Functional Test
3. Pull Cable Proof Load Test
4. Deflation
5. Visual

6. Liferaft Configuration
7. General Inspection
8. Markings Inspection
9. Inflation Assembly Inspection
10. Inspection of Inflation Assembly (Charged)
11. Inspection of Inflation Assembly (Discharged)
12. Cylinder Markings
13. Leakage
14. Records Updating
15. Repacking

5-25. CONTAINER/CASE INSPECTION. Refer to NAVAIR 13-1-6.3-2 for kit inspection procedures.

5-26. FUNCTIONAL TEST. Functionally test the LRU-23/P by inflating it using the CO₂ inflation assembly. This test will only test the inflation of the perimeter tube or chamber. The floor and canopy chambers can only be inflated orally (see [paragraph 5-37](#), Leak Test).

5-27. Flotation Chamber (Perimeter Tube). To functionally test the LRU-23/P, proceed as follows:



Ensure there is adequate area free of foreign objects before liferaft inflation.

1. Open liferaft carrying case and unfold liferaft.
2. Actuate the CO₂ inflation assembly.
3. Measure time of inflation; liferaft shall inflate to design shape without evidence of restriction in less than one minute.
4. Examine liferaft for obvious damage such as cuts, tears, ruptures seams, and damaged inflation assembly.

5. Determine cause if liferaft does not properly inflate. Remove inflation assembly, and inspect both inflation assembly valve and inflation stem for cleanliness and imbedded foreign matter.

6. If correction is made, repeat [steps 2 through 5](#).

7. Deflate liferaft in accordance with paragraph 5-28.

5-28. DEFLATION. To deflate the LRU-23/P life-raft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Rotary Vacuum (or equivalent)	61E44688 (CAGE 80049)
As Required	Hose, 3/8 or 1/2 inch Diameter, Rubber	—

1. Attach one end of rubber hose to vacuum pump.
2. Unlock applicable oral inflation valve, hold in open position, and hold vacuum pump hose against end of inflation valve. When cell is collapsed, release oral inflation valve and screw lock closed.

NOTE

The vacuum pump hose should be held at an angle to the inflation valve or air will not properly evacuate the cell.

5-29. PULL CABLE PROOF LOAD TEST. To perform the proof load test, proceed as follows:

NOTE

Perform the Proof Load Test only after the functional test and prior to placing an inflation assembly in service.

1. Remove inflation valve plastic valve sleeve.
2. Remove pull cable from valve and apply a 50-pound pull force between cable ball and pull cable.

NAVAIR 13-1-6.1-1

3. Examine pull cable for broken strands of wire, deformed pull cable, and loose or cracked swage fittings. If any damage is found, the pull cable shall be discarded and replaced with a new cable. The new cable shall also be tested in accordance with [step 2](#).

4. If pull cable passes this test, reinstall in accordance with [paragraph 5-46](#).

5-30. VISUAL INSPECTION. To visually inspect the liferafts, proceed as follows:



Remove CO₂ cylinder prior to inflating liferaft with air.

1. Remove CO₂ cylinder from CO₂ cylinder sling.

2. Cap inflation valve inlet or install an empty CO₂ cylinder in inflation valve.

NOTE

If a suitable air source is not available, water pumped nitrogen (BB-N-411) may be substituted.

Prior to visually inspecting a liferaft assembly, the liferaft and inflatable floor, shall be inflated with air to 1.0 psig.

3. Inflate liferaft with air to 1.0 psig through oral inflation valve.

NOTE

Mark areas of obvious or suspected damage with tailors chalk. No other marking method shall be used. The entire liferaft shall be inspected.

4. Fabric components for:

a. Cuts, tears, holes, abrasions, discoloration, deterioration, chafing, and contamination.

NOTE

Particular attention shall be given to area around inflation valve inlet union.

b. Biological contamination.

c. Fabric deterioration and/or contamination.

NOTE

Fabric deterioration and contamination is not always easy to assess; look for following symptoms.

(1) Discolored areas which do not disappear when washed with soapy water.

(2) Sticky areas.

(3) Hardened areas.

(4) Abnormally shiny or flat areas.

(5) Wrinkled or crazed areas.

d. Porous areas including oral inflation tubes which may exhibit porosity in the area where tubes are bent during packing process.

NOTE

Porous areas will not be visible but can be detected by brushing inflated areas with soapy water and watching for bubbles. Single bubbles indicate holes but numerous small bubbles usually indicate porous fabric. Porosity is usually caused by contact with oil, grease, solvent, a hot surface, or prolonged exposure to sunlight.

e. All welded seams for integrity including attachment points for oral inflation tubes.

f. Polyurethane coat wearing away or separating from fabric.

g. Attached parts and components (e.g loops, patches, and pockets) for security, deterioration, and damage.

h. Legibility of markings.

5. Metal and plastic components for:

a. Visor for cleanliness and general condition.

b. Integral bailer for integrity of reinforcing wire.

c. Inflation valve inlet union for condition of threads.

d. Incorrect function, leakage.

e. Cracking, scoring, distortion, corrosion, and burrs.

f. Loose unions, and attaching parts.

6. Webbing, cording, and elastic for damage, fraying, deterioration, discoloration, and security of attachment.

7. Inspect oral inflation tubes for bonding weld separation and for presence of reinforcement patch.

a. If the oral inflation tube for the main flotation compartment is separating/leaking, no repair or reinforcement shall be attempted.

b. If the main flotation compartment oral inflation tube is not separating and no reinforcement patch is present, refer to paragraph 5-60A for fabrication and bonding procedures for oral inflation tube reinforcement patch.

c. If the inflatable floor and canopy oral inflation tubes are separating repair may be attempted. Refer to paragraph 5-60A for repair and reinforcement procedures.

d. If the floor and canopy oral inflation tubes are not separating, and no reinforcement patch is present, proceed to paragraph 5-60A for fabrication and bonding procedures for oral inflation tube reinforcement patch.

5-31. DAMAGE ASSESSMENT. Liferaft with any of the following defects shall be removed from service and discarded.

NOTE

After liferafts have been used in salt water they shall be thoroughly washed in fresh water and air dried. Thereafter they may be used for training purposes only.

1. Damage to flotation chamber due to over-pressure.

2. Damage crossing or abutting a seam or welded dimple.

3. The total area of repair patches exceeds 25.5 square inches.

4. Contamination by oil, grease, alkali, or acid.

5. Oral inflation tube bonding weld separation on main flotation compartment. Canopy and floor oral inflation tube bonding weld separation after repair and reinforcement per paragraph 5-60A has failed.

6. Any oral inflation tube that demonstrates porosity.

5-32. MARKINGS INSPECTION. Restore faded markings. Correct any markings which do not agree with table 5-2. To change markings, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Ink, Marking, Laundry, Black	SPE-92 NIIN 00-161-4229
	-or-	
	Ink, Drawing, Waterproof, Yellow	A-A-59291 NIIN 00-634-6583

1. Paint over incorrect marking using waterproof ink (yellow or black as applicable).

2. Add correct marking as close as possible to specified location using waterproof ink.

5-33. INFLATION ASSEMBLY INSPECTION. Inspect the inflation assembly as required.

5-34. Inspection of Inflation Assembly (Charged). To inspect a charged inflation assembly, proceed as follows:

WARNING

Gas under pressure Do not attempt to remove valve from cylinder.

Ensure that diffuser plugs (P/N 1614703-1, CAGE 99251, NIIN 01-077-1734) are installed in CO₂ cylinders.

1. Inspect cylinder markings. Remark as required in accordance with paragraph 5-36.

WARNING

Damage to the slot that the sliplock is seated in may allow plastic cap and sleeve to unseat. If the sliplock is not seated properly on inflation valves which do not have spring clips installed, it may result in a malfunction of the liferaft inflation process.

1A. On inflation valves which do not have spring clips installed, verify the spring sliplock in the plastic cap and sleeve is properly seated in the slot on the inflation valve. Have technician loosen setscrew and gently move cap in an up and down motion to verify the sliplock is seated. Have technician align setscrew with the vertical groove on the inflation valve and retighten.

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damage or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced perform pull cable proof load test in accordance with [paragraph 5-29](#).

WARNING

Excessive glue around the FLU-6/P valve cap/sleeve may result in a malfunction of the liferaft inflation process. Remove excessive glue, then continue inspection.

3. (MIL-V-81722 (FLU-6/P) Valve) Examine pull cable for broken strands and loose or defective swage joints. Inspect plastic parts for cracks and breaks. Ensure that valve cap is cemented to plastic valve sleeve, and plastic valve sleeve is permanently attached to metal valve sleeve. Use polychloroprene adhesive (NIIN 00-515-2246) only.

NOTE

To obtain the correct gross weight of the CO₂ cylinder, subtract weight of the diffuser plug from total weight indicated on scale.

4. Weight inflation assembly. If weight indicated on scale is not the same as the gross weight printed on the cylinder (with tolerance specified), or if no gross weight is printed on the cylinder, discharge the cylinder and recharge it in accordance with [paragraph 5-46](#).

5-35. Inspection of Inflation Assembly (Discharged). To inspect a discharged inflation assembly, proceed as follows:

1. Inspect cylinder markings. Re-mark as required in accordance with [paragraph 5-36](#).

WARNING

Damage to the slot that the sliplock is seated in may allow plastic cap and sleeve to unseat. If the sliplock is not seated properly on inflation valves which do not have spring clips installed, it may result in a malfunction of the liferaft inflation process.

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, dents and any distortion to the lip of the slot that sliplock is seated in. If damaged or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced, perform pull cable proof load test in accordance with [paragraph 5-29](#).

3. (MIL-V-81722 Valve) Examine pull cable for broken strands and loose or defective swage joints. Inspect plastic parts for cracks and breaks. Ensure that valve cap is cemented to plastic valve sleeve, and plastic valve sleeve is permanently attached to metal valve sleeve. Use polychloroprene adhesive (NIIN 00-515-2246) only.

4. Recharge assembly in accordance with [paragraph 5-46](#).

5-36. Cylinder Markings. All CO₂ inflation cylinders shall be in black letters 1/4 inch high. Information shall include gross weight, tare weight, and weight of CO₂. Paint and stencil cylinder as required. Ensure that all markings are included as necessary.

5-37. LEAK TEST. To perform a leak test, proceed as follows:

5-38. Test Fixtures. As assembled, test fixtures are not stocked in the Supply System; test fixtures must be fabricated to meet the requirements of the schematic shown in [figure 5-3](#). A test fixture consisting of a three, way valve, pressure gage, and suitable adapters for the compartments being tested is shown in [Chapter 3](#).

5-39. Test Procedure. This test procedure for the LRU-23/P liferaft is used to test for leaks in the flotation chamber first, then simultaneous tests of floor chamber and canopy chamber. All inflation and deflation is through the oral inflation valve for each chamber. The CO₂ inflation assembly shall not be used in this test. To test liferafts for leakage, proceed as follows:

Table 5-2. LRU-23/P Liferaft Markings

Marking	Location	Letter Height
LIFERAFT TYPE PART NO. SERIAL NO. DATE MFR DATE PRFD DATE PIS	Centered on outside bottom of raft, top towards foot end.	1/2 inch
FLOOR & CANOPY TO ORALLY INFLATE UNSCREW KNURLED RING, PUSH VALVE MOUTHPIECE DOWN AND IMMEDIATELY BLOW THROUGH INLET.	In two places, on floor near floor inflation valve and on right inside wall near right side canopy inflation valve.	1/4 inch
BUOYANCY TO INCREASE PRESSURE, UNSCREW KNURLED RING, PUSH MOUTHPIECE DOWN AND IMMEDIATELY BLOW THROUGH INLET.	On left side wall near left side canopy inflation valve	1/4 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.		

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WARNING

The cylinder is charged with carbon dioxide gas through the FLU-6/P valve. Do not attempt to separate the valve and charged cylinder.

CAUTION

Ensure that area surrounding liferaft is clear of foreign objects and liferaft is not disturbed during leakage test.

If three-way valve is not used, measuring device valve must be closed when air-feed valves are open.

On liferaft, damage may occur to oral inflation valve if air supply pressure entering the liferaft exceeds ten (10) psi during this test.

NOTE

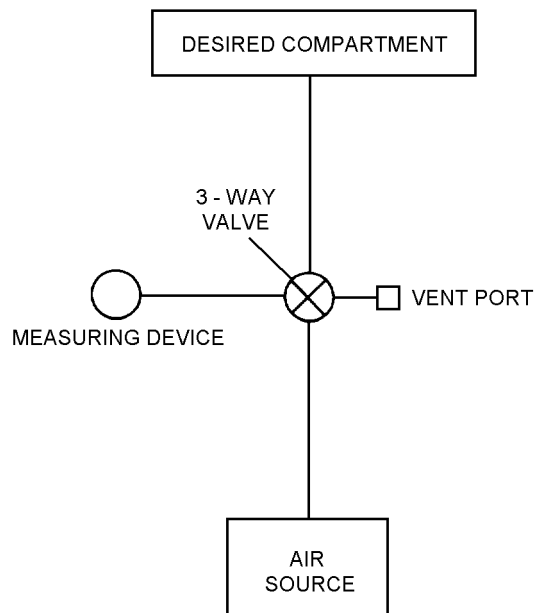
If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

1. A charged inflation assembly must be removed from the liferaft before proceeding. An inflation assembly which has been discharged or a suitable coupling nut must be installed onto the inlet stem to prevent any leakage from the inflation inlet stem.

2. Unlock flotation chamber oral inflation valve and insert into 1/2-inch diameter rubber hose. Open valve to air supply and inflate liferaft. Alternately position valve at measuring device, vent and air supply until proper pressure of 2.0 psig is attained.

3. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure shall be readjusted, if necessary, to the leakage test pressure.

4. Disconnect air supply and check for leaks. Ensure that all valves are closed. Record time.



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Figure 5-3. Test Fixture Schematic

5. Record temperature and barometric pressure and allow raft to remain undisturbed for a minimum of 4 hours.

NOTE

If the raft has been stacked during the 4-hour inspection period remove from stacking and place in a horizontal position on the floor or table in the inspection area and take test pressure reading. In no event shall the pressure in the raft be determined with another raft stacked upon it.

6. After a minimum of 4 hours after completing [step 4](#), record test pressure. Test pressure shall not decrease to less than 1.6 psig for the flotation chamber, from a maximum test pressure of 2.0 psig.

NOTE

Steps 7 through 9 shall be performed only after leakage test readings have been recorded.

7. Record temperature and barometric pressure and correct test pressure for any changes in temperature and barometric pressure. Refer to [tables 5-3](#) and [5-4](#).

EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	-5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057

UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

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Step 7 - Para 5-39**Table 5-3. Temperature Conversion Chart**

Temperature Difference (Degree F.)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.248
9	0.279
10	0.310
Rise in temperature: subtract from gage reading. Fall in temperature: add to gage reading.	

8. If pressure of flotation chamber is below pressure limits of 1.6 to 2.0 psig, inflate to leakage test pressure and check for leaks, using a soap solution. Mark leaks, rinse with fresh water, and dry with a lint free cloth. Determine repairability in accordance with [paragraph 5-51](#).

9. Check operation of oral inflation valve by depressing stem. Air must escape. Release stem, and flow of air must stop. Apply soap solution to valve and check for leakage. Inspect valve for damage, excessive wear and corrosion.

CAUTION

Do not over-inflate. Use very low pressure compressed air source to inflate floor and canopy. Over inflation could easily damage both the floor and canopy.

10. Ensure flotation chamber is re-inflated to 2.0 psig before proceeding with leak tests for floor and canopy chambers.

11. Test floor chamber and canopy chamber at the same time. Unlock floor/canopy oral inflation valves, then slowly inflate floor/canopy until quilting effect is well defined but not to exceed 0.6 psig as indicated on pressure gage.

NOTE

Check to ensure check valve feature of each oral inflation valve is functioning properly.

12. Check operation of each oral inflation valve by depressing stem. Air must escape. Release stem, and flow of air must stop. Apply soap solution to valves and check for leakage. Inspect valves for damage, excessive wear, and corrosion. Reinflate floor/canopy but do not exceed 0.6 psig.

13. Allow 15 minutes for stabilization, then re-adjust pressures to 0.6 psig as necessary.

NOTE

The liferaft shall not be stacked during this 4-hour inspection period. The liferaft shall be placed in a horizontal position on table, bench or floor during this time, and as appropriate during inspection of the inflated canopy chamber and floor chamber. In no event shall inspection of the raft be made with another raft stacked upon it.

14. Leave floor and canopy inflated for 4 hours. After that period sufficient pressure should remain in both the floor and canopy chambers to keep the fabric layers separated and the canopy erect (pressure readings of the floor and canopy are not taken). Refer to determination of repairability, [paragraph 5-51](#).

Table 5-4. Barometric Pressure Conversion Chart

Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368
Rise in pressure: add to gage reading. Fall in pressure: subtract from gage reading.									

15. Check floor/canopy for leaks by applying soap solution to surfaces and seams.

16. If there are leaks, determine repairability in accordance with [paragraph 5-51](#). If no leaks, proceed to step 17.

17. Deflate floor and canopy chambers in accordance with [paragraph 5-28](#).

18. Lock floor/canopy oral inflation valves.

19. Deflate flotation chamber in accordance with [paragraph 5-28](#).

20. Install anti-chafe disc.

21. Reinstall properly charged inflation assembly.

22. Tighten coupling nut to liferaft inlet valve to a torque value of 80 to 90 in-lb.

5-40. RECORDS UPDATING. Make necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

5-41. CLEANING AND SERVICING.

5-42. Cleaning and servicing consists of cleaning the liferaft and containers and/or cases, replacing the safety disc and washer on inflation valves, recharging CO₂ cylinders and safety-wiring inflation valves.

5-43. CLEANING OF LIFERAFTS. To clean life-rafts, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint-Free, Type II	MIL-C-85043 NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Solvents are not to be used in the cleaning of liferafts.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.
2. Apply cleaning solution to soiled area with a spray or sponge.
3. Allow solution to remain on the surface for several minutes, then agitate with a soft brush or rag.
4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.
5. Dry liferaft with a lint-free cloth and apply a light coating of talc.

5-44. CLEANING OF CONTAINERS AND/OR CASES. Clean in accordance with [paragraph 5-43](#).

5-45. REPLACEMENT OF SAFETY DISC AND WASHER ON INFLATION VALVES. (See [figure 5-4](#).) To replace safety disc and washer on inflation valve assemblies (MIL-V-81722)(FLU-6/P) proceed as follows:

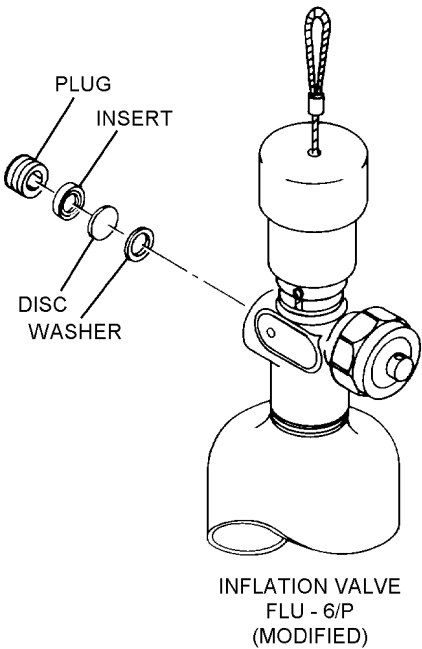


Figure 5-4. Disassembly of Inflation Valve Safety Disc Assembly

10050004



Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve or valve safety disc plug from a charged CO₂ assembly.

Support Equipment Required		
Quantity	Description	Reference Number
1	Wrench, Torque	—
1	Socket, 5/16 inch	—

Materials Required		
Quantity	Description	Reference Number
1	Kit, Repair (Insert, Washer, Disc)	903684 (CAGE 33525) NIIN 00-703-7811
1	Hex Stock, 5/16 x 2 inch Length	—

1. Remove cylinder from liferaft.

2. Remove safety disc plug; insert safety disc and washer.

3. Place new washer into inflation valve safety disc orifice.

4. Place new safety disc into inflation valve safety disc orifice.

5. Replace insert and safety disc plug.

NOTE

While tightening the safety disc plug, align insert with plug.

6. Tighten safety plug to 15 to 17 ft-lb torque.

5-46. RECHARGING. To recharge the inflation assembly, proceed as follows (see [figure 5-5](#)):

WARNING

When discharging partially charged or overcharged CO₂ cylinders, hold firmly in place with a suitable holding device (vice). Protect CO₂ cylinder from vice jaws with cloth or a suitable substitute. Position cylinders so escaping gas is not directed toward any personnel.

NOTE

Charged inflation assemblies used as spare replacements shall be inspected in accordance with [paragraph 5-34](#) prior to raft installation.

To perform the following filling procedures it is necessary to ensure that CO₂ cylinder is completely discharged.

1. Remove setscrew. Using small paper clip, raise spring slip-lock in slot on plastic sleeve. Remove plastic sleeve.

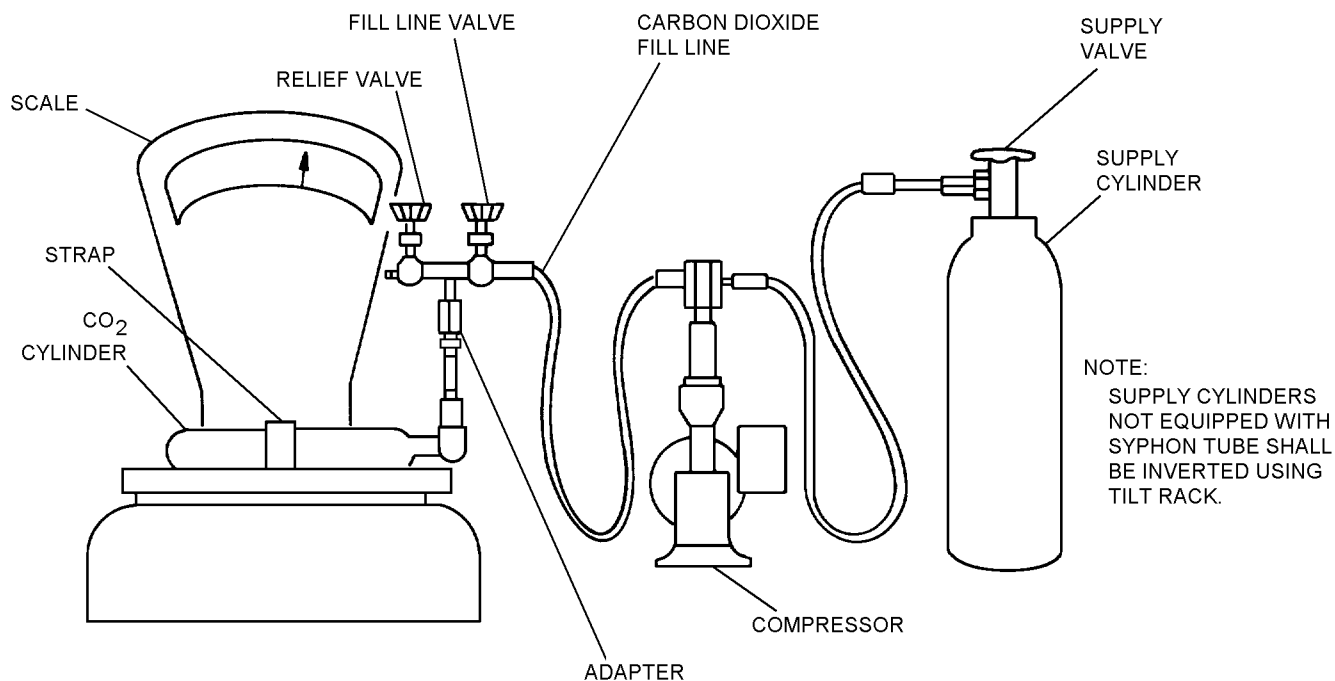


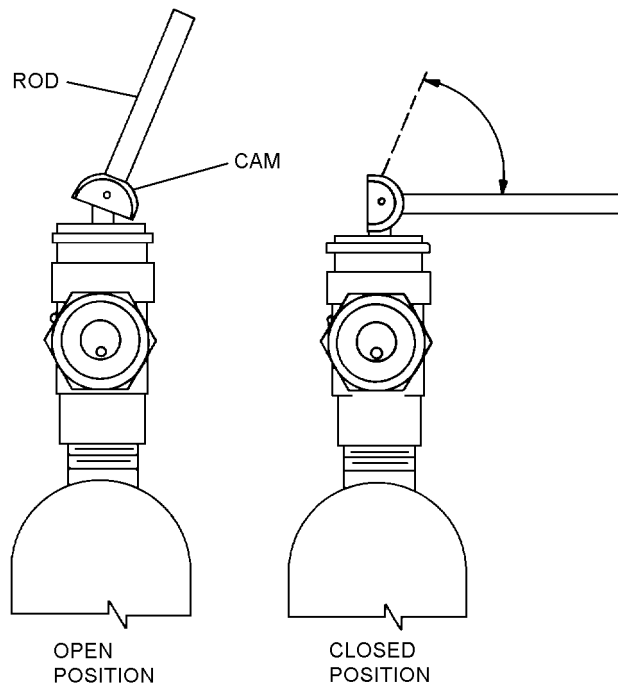
Figure 5-5. Recharging Schematic

10050005

NOTE

To facilitate cam rotation, insert 0.260 to 0.265-inch diameter rod into hole in cam.

2. Rotate cam 2 or 3 times to ensure proper operation. Remove diffuser plug, if installed.



Step 2 - Para 5-46

E0046006

3. Weigh and record tare weight (empty weight of cylinder, valve and cable assembly) of inflation assembly. Correct tare weight marking on cylinder if necessary.

NOTE

Supply cylinders not equipped with siphon tube must be inverted during transfer operation. Inverting cylinder allows the liquid to flow from the valve. Supply cylinders with siphon tube (straight pipe) extending from the valve to the bottom of the cylinder can be emptied in the upright position.

4. Install proper charging adapter on inflation assembly.

5. Secure inflation assembly to weighing pan.

6. Open supply cylinder valve, fill line valve and relief valve to purge fill line. Close fill line valve and relief valve.

NOTE

Ensure fill line is free from contact with any object along entire distance from compressor to charging adapter. If fill line does not hang free, accurate weight readings cannot be obtained.

7. Connect fill line to inflation assembly and zero scale.

8. Ensure inflation assembly valve is open.

9. Open fill line valve.

10. Allow carbon dioxide to cascade from supply cylinder into inflation assembly. If gross weight (tare weight plus weight of charge, 0.49 to 0.51 lbs) cannot be reached, start compressor and complete charging. Stop compressor upon reaching proper gross weight.

11. Close fill line valve.

12. Close inflation assembly valve. Open relief valve on fill line valve if applicable.

13. Disconnect fill line from inflation assembly. Remove charging adapter.

14. Measure gross weight of charged inflation assembly.

15. If gross weight of inflation assembly is greater than required, carefully bleed off excess from inflation assembly. If gross weight is less than required, reinstall charging adapter and repeat [steps 7 through 16](#).

16. Reinstall diffuser plug, if applicable.

NOTE

When other cylinders are to be recharged immediately, leave supply cylinder valve open.

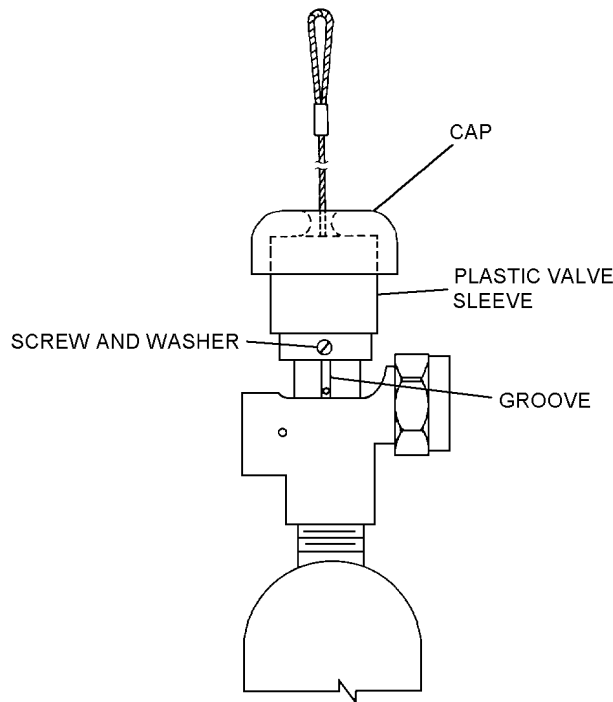
17. Close supply and bleed system pressure.

WARNING

Damage to the slot that the sliplock is seated in may allow plastic cap and sleeve to unseat. If the sliplock is not seated properly on inflation valves which do not have spring clips installed, it may result in a malfunction of the liferaft inflation process.

18. Place ball end of cable through sleeve and into hole in cam. Align screw hole in sleeve with groove

on valve and slide sleeve over cam and onto valve. Using a paper clip, raise spring sliplock in slot on sleeve and ensure sleeve is fully seated and raised. Install screw and washer. On inflation valves which do not have spring clips installed, verify the spring sliplock in the plastic cap and sleeve is properly seated in the slot on the inflation valve. Have technician loosen setscrew and gently move cap in an up and down motion to verify the sliplock is seated. Have technician align setscrew with the vertical groove on the inflation valve and retighten.



Step 18 - Para 5-46

E0046018

NOTE

Ensure valve cap is cemented to plastic sleeve. Use polychloroprene adhesive (NIIN 00-515-2246) only.

Valves received from supply without spring clip are to be considered RFI. Spring clip is no longer required.

The FLU-6/P inflation valve can be cocked on either of the two opposite flats on the cam head. When cocked on one of the flats after recharging, leakage may be possible because of a slightly asymmetrical cam head. After recharging the cylinder, submerge assembly in water, observe for bubbles from valve, the dry and store for 24 hours. After storage period check for

proper weight. If no leakage, return assembly to service after ensuring valve cam is fully seated on flat. If leakage has occurred, recharge, recock on opposite flat and perform the above text for leakage. If no leakage, return assembly to service. If leakage has occurred again, return valve to supply.

19. Immerse inflation assembly in water tank.

20. Check for leaks; then remove assembly from tank and dry with an air blast. Wipe assembly with a lint-free cloth.

NOTE

After storage period, inflation assembly should be checked for proper weight of charge, 0.49 to 0.51 lbs.

21. If required, re-mark tare weight, gross weight, charge weight on cylinder.

22. If inflation assembly is not to be installed, attach a red tag with the following instructions printed in ink: WARNING: WEIGH INFLATION ASSEMBLY BEFORE INSTALLING ON LIFERAFT. DO NOT INSTALL IMPROPERLY CHARGED CYLINDER.

5-47. REPAIR/REPLACEMENT.

5-48. This section contains instructions for the repair, replacement, modification or fabrication of various components or subassemblies of liferafts to ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for parts which are defective, corroded or worn and require replacement are included in the applicable paragraph of this section. Other replacement parts, such as carrying cases and personal survival equipment, are listed in the applicable table. All repairs shall be documented by making the necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

5-49. Replacement of easily removed assembly components such as CO₂ inflation valves and survival items are authorized in addition to repair and replacement procedures documented in this section. The liferaft shall be subjected to a functional test and leakage test each time CO₂ inflation valves are removed and replaced for any reason, and each time inflation valve gaskets are replaced.

5-50. Repair and replacement of liferaft and components shall be limited to the following:

NOTE

Repair of the canopy visor is not authorized.

- 1. Patching holes, cuts, and tears in fabric components.

NOTE

The total area of patches shall not exceed 25.5 square inches, including area of existing patches.

A porous area shall be considered a single hole of similar dimensions.

- 2. Replacement of oral inflation valve on floor, canopy, and flotation chamber inflation tube assemblies.
- 3. Replacement of sea anchor.
- 4. Replacement of cordage, webbing, elastic, hook-and-pile fastener, and snap fasteners and eyelets.

5-51. DETERMINATION OF REPAIRABILITY.

Liferafts shall be considered beyond repair for any of the following reasons:

- 1. Porous fabric areas on any inflatable area.
- 2. Split or open tube seams.
- 3. Leakage test failure resulting from other than cut, tear, or puncture.
- 4. Damaged, malfunctioning, excessively worn, or corroded inlet valve or oral inflation tube.
- 5. Extensively damaged floor.
- 6. Oral inflation tube separating from main flotation compartment or inlet valve stem separating from fabric on liferaft.
- 7. Deterioration of the fabric caused by oil, grease, or any other foreign substance.
- 8. Deterioration of the fabric caused by a heavy mildewed condition.
- 9. Rips, tears, abrasions or punctures in the pneumatic compartments which exceed 2 inches.

- 10. In the judgment of a competent inspector, requiring excessive repair.

5-52. CEMENTING LIFERAFTS.

All cementing of liferafts shall be performed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620 NIIN 00-243-9401

Materials Required

Quantity	Description	Reference Number
1	Disposable Brush	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
-or-		
As Required	Methyl Ethyl Ketone, (MEK)	TT-M-261 NIIN 00-281-2762
	Adhesive, Polyurethane	UR-1092 NIIN LH-000-1650
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Do not use toluene or MEK near open flames, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Use only polyurethane adhesive and polyurethane-coated cloth on heat sealed polyurethane LRU-23/P liferaft assemblies.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

NOTE

Toluene or MEK must be applied vigorously to liferaft material over three years old in order to reactivate the material prior to cementing. Pigment from the material coloring staining a cloth rubbed over the treated surface will indicate the material has been reactivated. Cement shall be applied immediately after the surface has dried.

1. Clean both surfaces to be cemented with four applications of toluene or MEK. Apply toluene or MEK with back-and-forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow area to dry between applications.



The effective active period of adhesive mixtures composed of polyurethane and accelerator is eight (8) hours. Do not use mixture if older than eight hours.

2. Prepare only enough mixture for 8 hours. Dispose of any remaining mixture after that time.

3. Using a disposable brush, apply cement to completely cover surfaces to be cemented. Use long, one direction strokes and complete each surface before cement becomes tacky as the brush may pull tacky cement from the surface. Allow to dry for 10 minutes.

4. Apply a second coat of cement as in [step 3](#). Use brush strokes perpendicular to the original direction.

5. When second coat of cement has become tacky, place pieces together. If cemented area has a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden roller.

6. Allow cement to cure a minimum of 48 hours.

7. Dust area with talc (MIL-T-50036A).

■ 5-53. Deleted

5-54. Patching Liferafts. Patching is the normal method of repair of fabric panels on both inflatable and non-inflatable liferaft parts.

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620 NIIN 00-243-9401

Materials Required

Quantity	Description	Reference Number
1	Cloth, Nylon, single ply, polyurethane coated, Type I	MIL-C-83489
1	Tailors Chalk	—
As Required	Toluene	TT-T-548 NIIN 00-251-2002

NOTE

Use of cloth from BCM raft/life preservers is authorized for repair, with the following exceptions: Inflatables condemned for contamination (oil, grease, etc.) and ALSS equipment involved in mishaps shall not be used for repairs.



Use only Polyurethane adhesives and polyurethane-coated cloth and patches on heat sealed polyurethane LRU-23/P liferaft assemblies

1. Repair small cuts, tears, abrasions, and holes by patching using polyurethane coated cloth of same color as article being repaired cut to appropriate size and shape ([figure 5-6](#)).

2. Patches shall extend not less than one inch beyond the perimeter of the damage. For example:

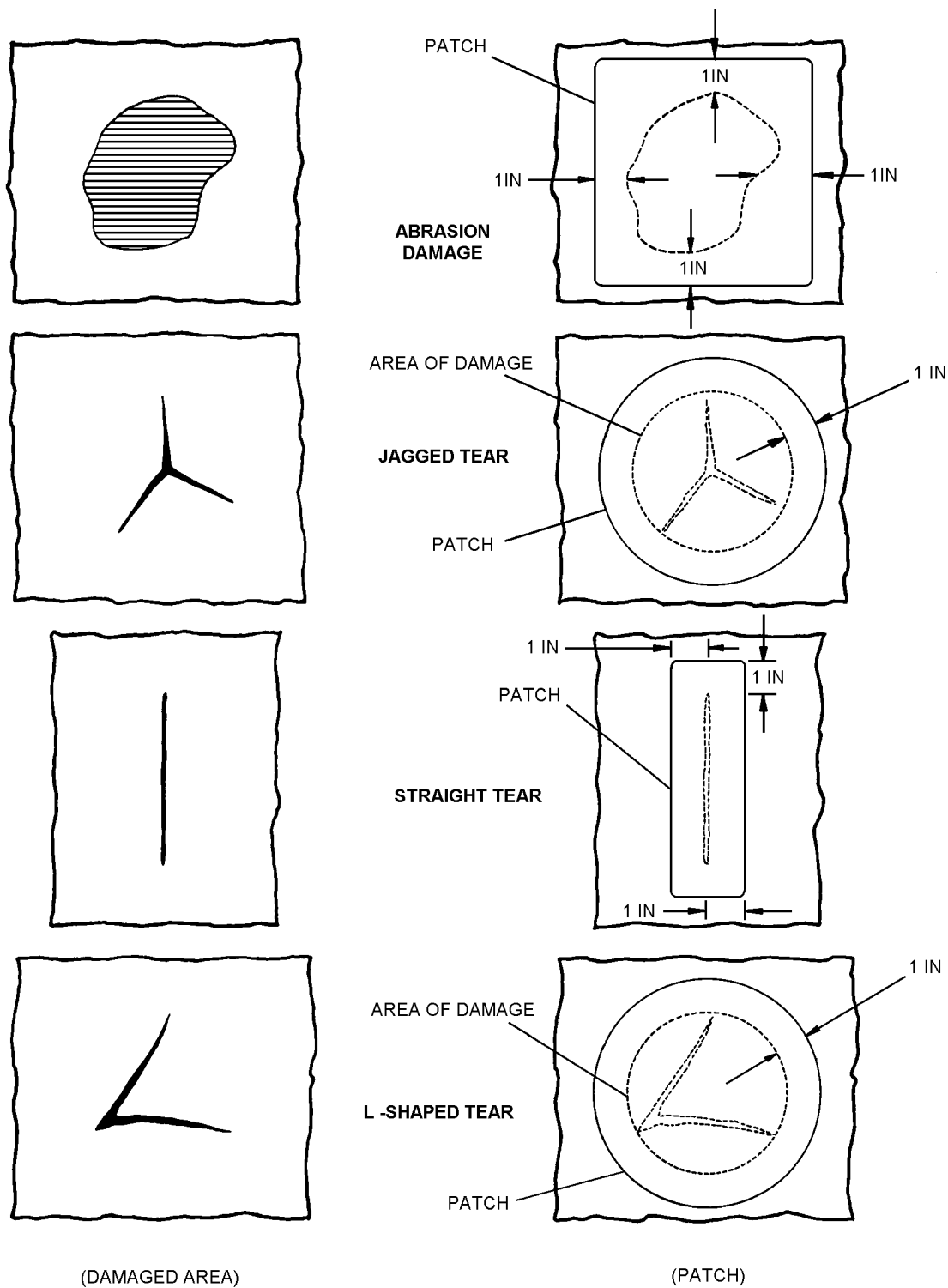


Figure 5-6. Patch Specifications

10050006

a. If diameter of hole is 1 inch, the diameter of the patch shall be 3 inches.

b. If a straight line tear is 1.5 inches long, the patch shall be 3.5 inches by 2 inches.

c. L-shaped cuts or tears shall be considered holes of a diameter equal to distance between ends of cut or tear.

3. Patches shall be circular or rectangular with rounded corners.

4. Patches shall not be placed closer than 0.5 inch to fabric spot welds when patching the inflatable floor or hood.

5. Whenever possible, patches shall be positioned with patch warp in line with panel warp.

6. Cement patch to damaged area in accordance with [paragraph 5-52](#).

NOTE

After repair there shall be no visible distortion when pressurized.

5-55. RECEMENTING OR REPLACING SEAM TAPES. This repair shall be performed only if a flotation tube does not leak, that is, if only the outer seam tape is loose, or if the seam does not seal a flotation tube. To recement or replace a seam tape, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Toluene	TT-T-548 NIIN 00-281-2002
-or-		
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762

NOTE

Seam separation in floors and seats may be repaired provided safety and flotation capabilities are not compromised. Exercise sound judgment in determining whether such repairs are within local capabilities.

All cementing shall be performed in accordance with [paragraph 5-52](#).

1. If tape is present and undamaged, recement tape to liferaft.

2. If tape is missing, measure and fit a replacement tape to area and cement in place. Overlap other seams a minimum of 1 inch.

WARNING

Do not use toluene or MEK near open flame, heat, or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.

CAUTION

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

3. If tape is damaged, peel damaged tape from liferaft. Apply toluene or MEK only as needed to loosen tape. Trim damaged tape and replace with new tape. Overlap other seam tape a minimum of 1 inch.

4. Perform leakage test.

5-56. SEA ANCHOR/MOORING LINE REPLACEMENT. Replacement of sea anchor is performed with the liferaft deflated. To replace worn or damaged sea anchor or mooring line, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Sea Anchor	67A318H2-13
As Required	Cord, Nylon Type III	MIL-C-5040

1. Sear both ends of a 16-foot length of MIL-C-5040 Type III nylon cord. Secure one end to sea anchor bridle, and other end to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

2. Route end of replacement sea anchor attachment line through patch loop on bow of liferaft and tie bowline knot. Tack with three turns of waxed, size E, nylon thread, single. Tie ends of thread with surgeon's knot followed by square knot

3. Lay sea anchor flat adjacent to bow of raft and fake attachment line into center of sea anchor. Roll sea anchor with attachment line enclosed.

4. Position rolled sea anchor between hook-and-pile fasteners on bow of raft. Crease liferaft at this point so fastener strips engage around sea anchor, securing sea anchor and attachment line.

5-57. INSPECTION RECORD PATCH.

NOTE

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life-rafts. The requirement for all other record documentation remains unchanged. The reason for this change is that most Inspection Record Patches are unreadable, and the packer's and inspector's names, including the type of inspection (leak/functional), are documented on Aviation Crew Systems Records.

Figure 5-7. Deleted

5-58. FABRICATION OF ANTI-CHAFING DISC.
To fabricate the anti-chafing disc, proceed as follows:

Materials Required

Quantity	Description	Reference Number
6 x 12 inches	Cloth, Nylon Polyurethane coated	MIL-C-23070

1. Cut two 6-inch diameter discs from nylon life-raft cloth and cut a 1-inch diameter hole in center of each disc.

NOTE

Cement applications shall be performed in accordance with paragraph 5-52.

2. Cement discs together and allow cement to dry.

3. Place disc over inlet valve before installing inflation assembly.

5-59. MODIFICATION OF THE FLU-6/P TYPE INFLATION VALVE. To modify a MIL-V-81722 (FLU-6/P) inflation valve, proceed as follows:

Materials Required

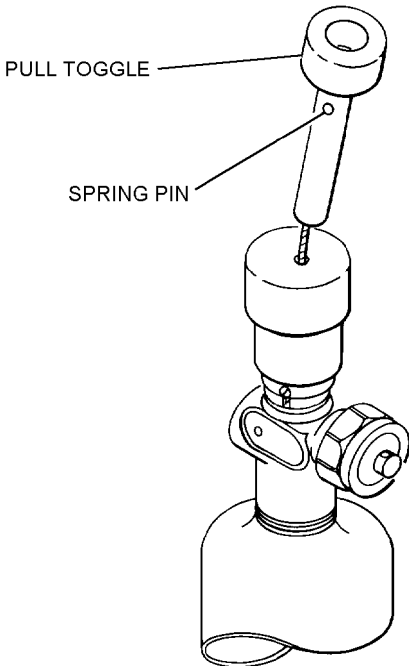
Quantity	Description	Reference Number
As Required	Ink, Black Waterproof	SPE-92 NIIN 00-161-4229

- 1. Remove the liferaft, if stowed.
- 2. Disconnect and remove the CO2 inflation assembly (valve and cylinder) from the liferaft, if installed.



Clamp the CO2 inflation assembly in a suitable restraining device (vise) when removing the spring pin from the valve pull toggle.

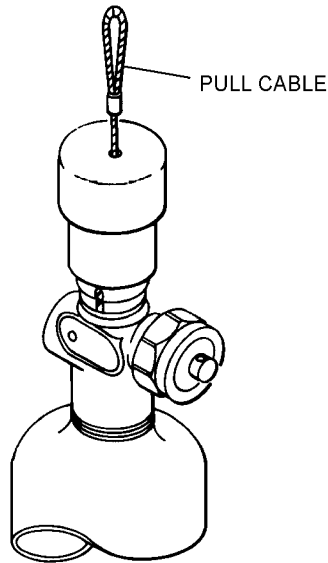
3. Extract and scrap the spring pin from the pull toggle shaft.



Step 3 - Para 5-59

E0059003

4. Remove and scrap the pull toggle. Do not remove the valve pull cable.



Step 4 - Para 5-59

E0059004

5. Re-mark the new CO₂ inflation assembly tare and gross weights. New weights should be old weight minus 0.03 lb (weight of plastic pull toggle).

6. Install modified inflation assembly on liferaft.

NOTE

To preclude tension on the CO₂ valve pull cable, allow slack in the lanyard while packing raft.

7. Rerig and reinstall onto liferaft in accordance with NAVAIR 13-1-6.3-2.

5-60. REPLACEMENT OF ORAL INFLATION VALVE. To replace the oral inflation valve, proceed as follows:

NOTE

Replacement oral inflation valves can only be obtained through salvage of BCM'd or surveyed inflatable survival equipment.

Materials Required

Quantity	Description	Reference Number
1	Valve, Oral Inflation	—
As Required	Cement, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Brush, Disposable	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
-or-		
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762

CAUTION

Only toluene or MEK shall be used to clean oral inflation valve and tube. Only polychloroprene cement (MIL-T-5540, NIIN 00-142-9913) shall be used to cement oral inflation valve into oral inflation tube.

1. Carefully cut through metal clamp securing oral inflation valve to oral inflation tube and remove the metal band and oral inflation valve.

2. If the tip of the oral inflation tube was damaged during removal of valve, trim off damaged section.

3. Clean both surfaces to be cemented with toluene or MEK. Allow areas to dry.

4. Using a small disposable brush, carefully apply a small amount of polychloroprene cement to the surfaces of the tube and the valve which are to be cemented together.

5. Immediately place oral inflation valve into oral inflation tube. Oral inflation valve should be inserted up to valve shoulder. Inspect for proper application/cement.

6. Tightly wrap the cemented portion of the oral inflation tube with cord or wire and allow to cure for 48 hours before removing wrap.

7. Perform leakage test in accordance with [paragraph 5-37](#).



5-60A. REPAIR AND REINFORCEMENT OF ORAL INFLATION TUBE BONDING WELDS. To repair canopy and floor oral inflation tubes, and reinforce all oral inflation tubes proceed as follows:

NOTE

Repair of the main flotation compartment oral inflation tube bonding weld is not authorized.

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive, Polyurethane	UR-1092 NIIN LH-000-1650
As Required	Cloth, Nylon, Polyurethane coated	MIL-C-83489
As Required	Brush, Disposable	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762

NOTE

Cementing for the following procedures shall be in accordance with [paragraph 5-52](#).

1. To reinforce the main flotation chamber oral inflation tube:
 - a. Cut two, three inch diameter patches. Cement two patches together with a polyurethane coated side cemented to a nylon side.
 - b. Mark and cut a center hole in patch, size to fit oral tube base, approximately 5/16-inch to 9/16-inch diameter. Center hole when cut should fit snugly around base of oral tube.
 - c. Using shears, cut from the outside perimeter to the center hole of the patch, this is to allow ease of placement around the oral inflation tube.
 - d. Clean both surfaces to be cemented. The reinforcement patch shall be positioned around the oral inflation tube with the polyurethane side up, the nylon side of the patch is cemented to the nylon material of the raft.

e. Cement the reinforcement patch around the oral inflation tube in accordance with [paragraph 5-52](#).

2. To repair/reinforce the floor and canopy compartment oral inflation tubes:

- a. Cut two, three-inch diameter patches. Mark patches “T” and “B” for top and bottom. The bottom patch will be cemented to the raft material nylon side down, the top patch will be cemented to the bottom patch polyurethane side up.
- b. Mark a center line from 12 to 6 and 3 to 9 o’clock positions on the polyurethane side of the bottom patch. Mark and cut a 5/16-inch diameter center hole.
- c. Mark and cut a 1 and 1/4-inch diameter center hole in the top patch.
- d. Cement nylon side of top patch to polyurethane side of bottom patch.
- e. Extend center lines on bottom patch to outside perimeter of top patch. Locate one of the center lines on the outside perimeter of the patch. Cut the patch from the outside perimeter to the center hole of the bottom patch, this is for ease of placement around the oral inflation tube.
- f. Locate the remaining three center lines on the bottom patch. Cut from the center hole of the bottom patch (5/16-inch diameter hole) on each line until it meets the top patch (about 3/4 inch). When completed there should be four corners which make up the bottom patch center hole.
- g. Clean both surfaces to be cemented, including the first 3/4 inch of the oral inflation tube.
- h. Cement the repair/reinforcement patch around the oral inflation tube in accordance with [paragraph 5-52](#). About 1/4 inch of each tab will be cemented to the base of the oral inflation tube.
- i. Perform leakage test in accordance with [paragraph 5-37](#).

5-61. PACKING LRU-23/P LIFERAFT ASSEMBLY.

5-62. Refer to [paragraph 5-9](#) for applications. The LRU-23/P liferaft assembly shall be packed in accordance with NAVAIR 13-1-6.3-2.

Section 5-4. Illustrated Parts Breakdown (IPB)

5-63. GENERAL.

5-64. This section lists and illustrates the assemblies and detail parts associated of the LRU-23/P Liferaft.

5-65. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

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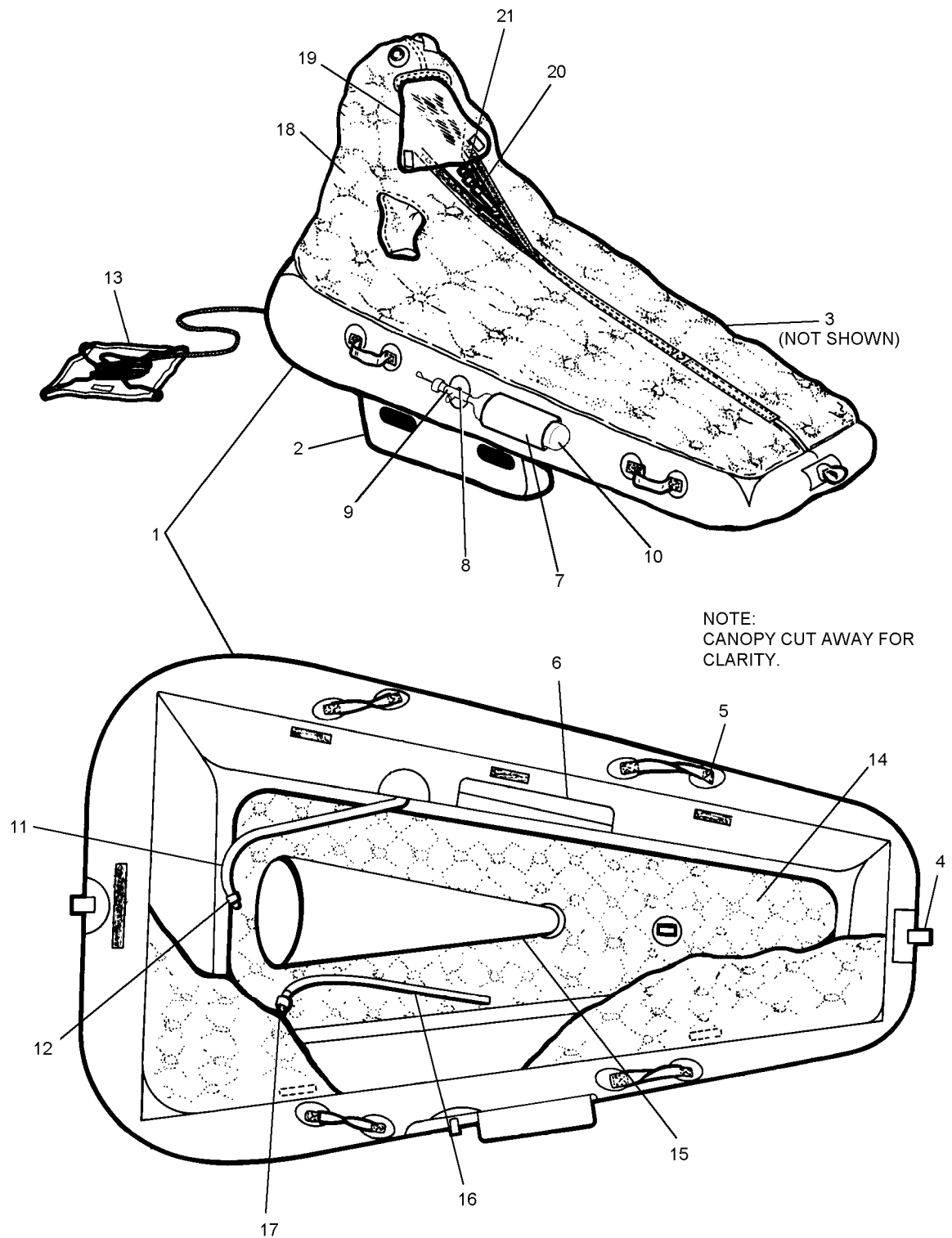


Figure 5-8. LRU-23/P Liferaft Assembly

10050008

NAVAIR 13-1-6.1-1

Figure and Index Number	Part Number	Description							Units Per Assembly	Usable On Code
		1	2	3	4	5	6	7		
5-8	MBEU142543	LRU-23/P LIFERAFT ASSEMBLY							REF	
-1	4015401	. LIFERAFT, LRU-23/P (Note 1)							1	
-2	4011401	. . BALLAST BAG, RH							1	
-3	4011701	. . BALLAST BAG, LH							1	
-4	4010901	. . PATCH, LOOP							1	
-5	4011101	. . HANDLE, BOARDING							1	
-6	4017501	. . POCKET, STOWAGE							1	
-7	4023801	. . POCKET, CYLINDER							1	
-8	4003601	. . VALVE, INLET							1	
-9	MIL-V-81722	. . FLU-6/P INFLATION VALVE							1	
-10	MS26545B2C0020	. . . CO ₂ CYLINDER							1	
	MS26545B4C0021	. . . CO ₂ CYLINDER							1	
-11	4035131	. . VALVE ASSY, INFLATION, FLOTATION ...							1	
-12	800-ROL	. . . VALVE, ORAL INFLATION							1	
-13	4014601	. . SEA ANCHOR							1	
	67A318H2-13	. . SEA ANCHOR (Note 2)							1	
-14	4010501	. . FLOOR							1	
-15	4011501	. . . BAILER							1	
-16	4035111	. . . VALVE ASSY, INFLATION, FLOOR							1	
-17	800-ROL	. . . VALVE, ORAL INFLATION							1	
-18	4011901	. . CANOPY ASSEMBLY							1	
-19	4011601	. . . VISOR							1	
-20	4035121	. . . VALVE ASSY, INFLATION, CANOPY							1	
-21	800-ROL VALVE, ORAL INFLATION							1	
NOTE:		1. Stock number for liferaft assembly is 4220-99-352-4975. 2. Sea Anchor P/N 67A318H2-13 will replace Sea Anchor P/N 40146 thru attrition.								

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
-------------	----------------------------	--------------

MIL-V-81722	5-8-9	PAOGG
MS26545B2C0020	5-8-10	PAOZZ
MS26545B4C0021	5-8-10	PAOGG
4003601	5-8-8	
4010501	5-8-14	
4010901	5-8-4	
4011101	5-8-5	
4011401	5-8-2	
4011501	5-8-15	
4011601	5-8-19	
4011701	5-8-3	
4011901	5-8-18	

Part Number	Figure and Index Number	SM&R Code
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4014601	5-8-13	PAGZZ
4015401	5-8-1	
4017501	5-8-6	
4023801	5-8-7	
4035111	5-8-16	
4035121	5-8-20	
4035131	5-8-11	
67A318H2-13	5-8-13	PAOZZ
800-ROL	5-8-12	
	5-8-17	
	5-8-21	

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CHAPTER 6

LRU-18/U LIFERAFT ASSEMBLY

Section 6-1. Description

6-1. GENERAL.

6-2. The LRU-18/U is one-man liferaft intended for use by aircrewmembers forced down at sea. It can also be used when forced down over land for fording rivers and streams or as shelter. It is a light-weight raft designed to replace the bulkier and heavier LR-1 in certain applications. See [figures 6-1 through 6-4](#).

rigging and packing instructions for the LRU-18/U Liferaft and the SRU-37/P Helicopter Backpack only. Refer to NAVAIR 13-1-6.3-1 for description, inspection, maintenance, and repair procedures for the SKK-9 Liferaft and Survival Kit Container Assembly, including rigging and packing instructions for the LRU-18/U Liferaft into the SKK-9.

6-3. CONFIGURATION.

6-4. The LRU-18/U liferaft assembly consists of a one-man liferaft and an inflation assembly (CO₂ cylinder and inflation valve). The liferaft is fabricated from heat-sealable, polyurethane-coated nylon cloth. It has two separate cells, each comprised of a series of tubes. The upper second, third and fourth tubes are inflated with carbon dioxide, and the remaining tubes are inflated orally.

6-6. The LRU-18/U liferaft assembly is mandatory for use by all authorized helicopter and E-2C aircrewmembers during overwater flights. See [table 6-1](#) for aircraft applications.

6-7. FUNCTION.

6-8. The LRU-18/U liferaft assembly is inflated manually by pulling the beaded inflation handle which actuates the CO₂ inflation assembly. The inflation assembly inflates the upper second, third and fourth tubes. After boarding, additional buoyancy and free board may be added by orally inflating the remaining tubes through the oral-cell oral inflation valve.

6-5. APPLICATION.

NOTE

This chapter contains description, inspection, maintenance and repair procedures,

Table 6-1. LRU-18/U Aircraft Applications

Packaged LRU-18 Liferaft Assembly	Aircraft
SRU-37/P One-Man Vee-Bottom Liferaft and Container Assembly (Helicopter Backpack)	All Helicopters
SKK-9 One-Man Vee-Bottom Liferaft and Survival Kit Container Assembly	E-2C (aircraft equipped with A/P22P-11 Crew Backpack) (See NAVAIR 13-1-6.3-1)

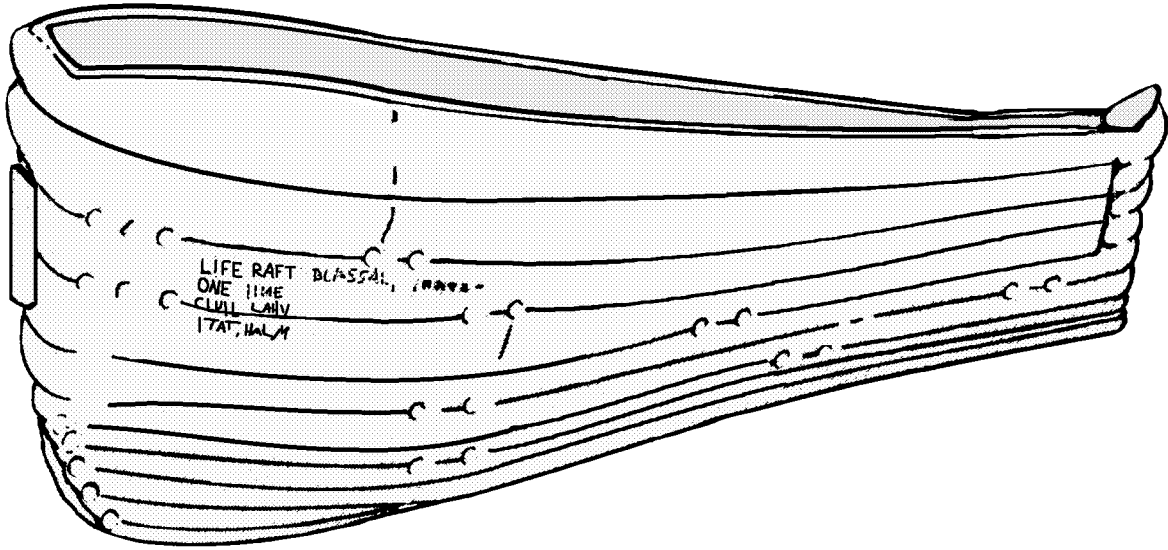


Figure 6-1. LRU-18/U Liferaft Assembly

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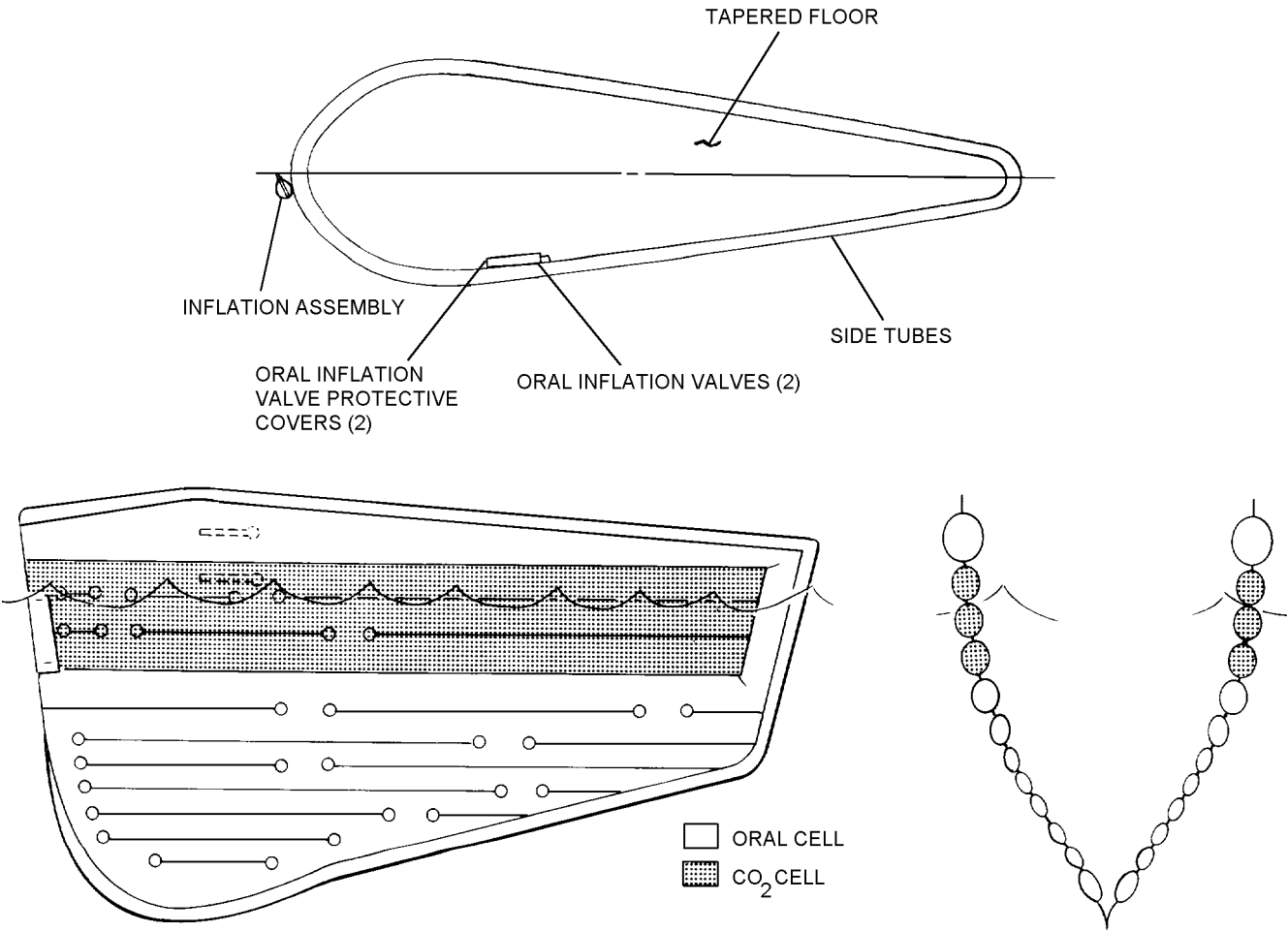


Figure 6-2. LRU-18/U Liferaft, Parts Nomenclature

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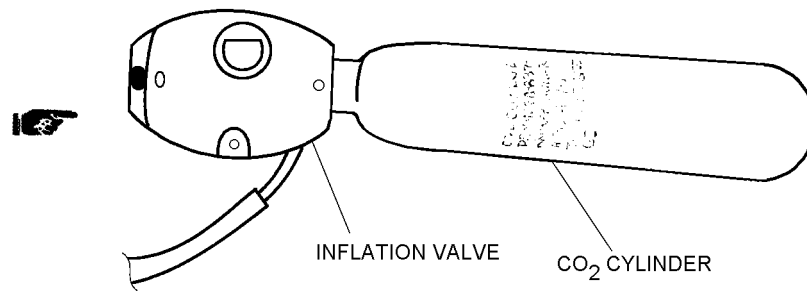


Figure 6-3. Carbon Dioxide Inflation Assembly

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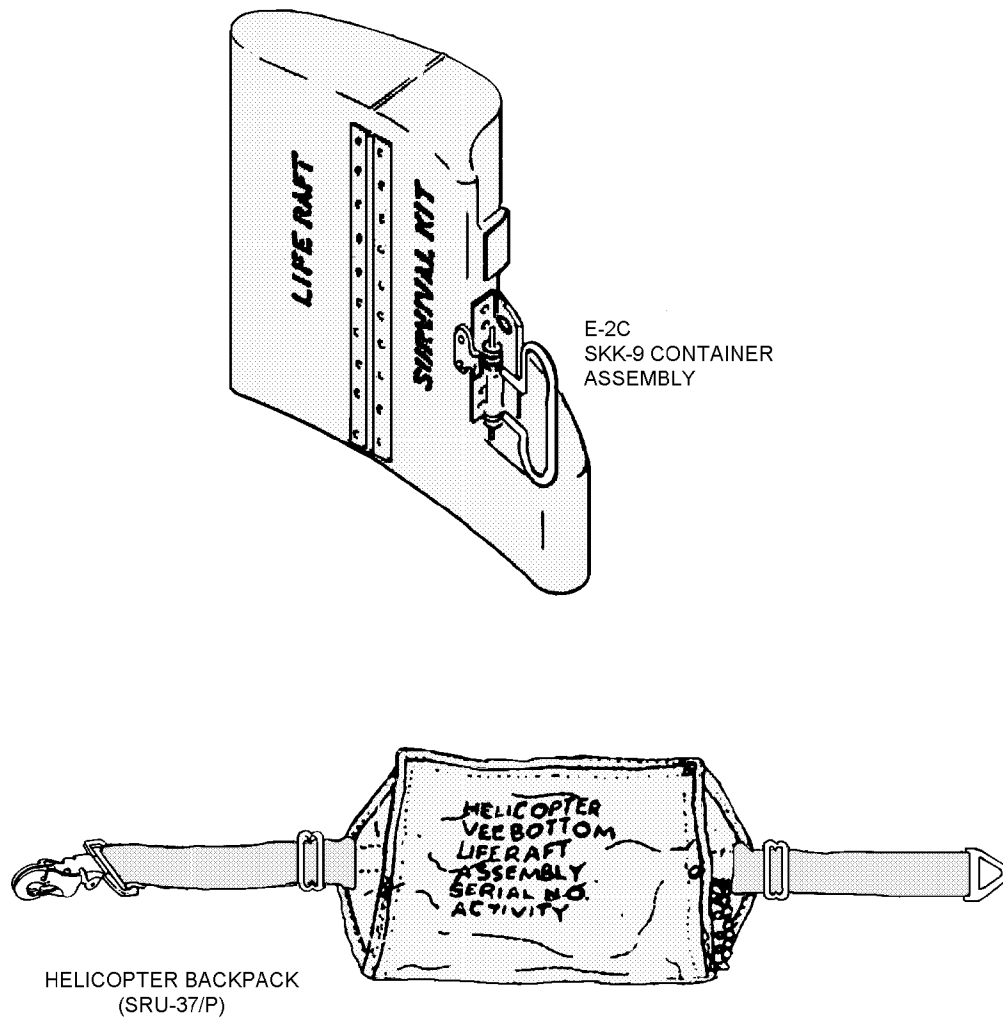


Figure 6-4. Packaged LRU-18/U Liferaft Assemblies

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Section 6-2. Modifications

6-9. GENERAL.

6-10. The LRU-18/U Liferaft Assembly shall be up-graded by comparing the configuration of the assem-

bly with the modification listed in table 6-1A. Common repairs and fabrication instructions to maintain serviceability are listed in [table 6-2](#).

Table 6-1A. LRU-18/U Series Directives

Description of Modification	Application	Modification Code
Replacement of Pneumatic Inflator Valve	All LRU-18/U Liferafts	66-660

Table 6-2. LRU-18/U Common Repairs and Fabrications

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	6-49
Cementing	6-50
Patching	6-51
Replacement of Oral Inflation Valve	6-53
Replacement of CO ₂ Inflation Valve	6-54
Replacement of Check Valve Assembly	6-55
Replacement of Beaded Inflation Handle Assembly (Backpack)	6-56
Replacement of Quick Ejector Snap (SRU-37/P)	6-57 (Note 1)
Replacement of Triangular Link (SRU-37/P)	6-58 (Note 1)
Fabrication of Protective Cover	6-59
Fabrication of Tether Line (SRU-37/P)	6-60 (Note 1)
Notes: 1. LRU-18/U Liferafts used with Helo Backpack	

Section 6-3. Maintenance

6-11. GENERAL.

6-12. This section contains information on inspection, disassembly, repair/replacement, testing, reassembly and rigging/packing of the LRU-18/U Liferaft.

6-13. All maintenance shall be performed in a work area having a stable moderate temperature, ideally not less than 68°F (20°C). The area shall also be free of drafts and direct sunlight and have a smooth-top table free of snags, splinters, and rough surface. There shall be sufficient space to ensure inflated rafts are kept clear of heating equipment, rough surfaces, and other objects capable of causing damage to the liferaft.

6-14. INSPECTION.

6-15. This Section contains inspection and testing procedures applicable to LRU-18/U liferaft assembly.

6-16. All LRU-18/U liferaft assemblies shall be subjected to preflight, Special and Calendar/ Phase Inspections.

NOTE

Refer to NAVAIR 13-1-6.3-1 for inspection requirements for the E-2C SKK-9 container assembly.

6-17. The preflight Inspection shall be performed on LRU-18/U liferafts prior to each flight by the aircrewmembers to whom the liferaft is assigned.

6-18. The Special Inspection shall be performed on all aircraft-installed liferafts at intervals not to exceed 30 days. The inspection shall be performed at the organizational level of maintenance by personnel assigned to the Aviator's Equipment Branch.

6-19. Upon completion of the inspection, the inspection date and inspector's signature shall be entered on the appropriate form in accordance with OPNAVINST 4790.2 Series.

6-20. All liferafts shall be subjected to the Calendar/Phase Inspection prior to placing in service, or if an aircraft inventory item at the time of the aircraft Acceptance Inspection. The inspection cycle thereafter shall be as follows: coincide with the aircraft inspection cycle in which installed, except the helicopter backpack, which shall be inspected every 360 days. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 366 days for helicopter backpacks. Unless operational requirements demand otherwise, the liferaft Calendar/Phase Inspection shall be performed by intermediate level maintenance or above. The functional test shall be performed prior to placing in service, during every fourth inspection cycle, and whenever an inflation assembly is replaced. The leakage test shall be performed during every inspection cycle.

6-21. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Collateral Duty Quality Assurance Representative (CDQAR) prior to proceeding the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center or be screened and examined by the Quality Assurance Officer as a Collateral Duty Quality Assurance Representative. In no case shall as Aircrew Survival quipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

6-22. PREFLIGHT/SPECIAL INSPECTION (SRU-37/P). To perform a Preflight/Special Inspection, proceed as follows:

WARNING

Ensure that the beaded inflation handle is readily accessible. The beaded inflation handle shall be secured with four snap fasteners to the backpack container.



Do not open any sealed or safety-wired/safety-tied portions of the liferaft for Pre-flight/Special Inspection.

1. Inspect exposed metal parts for corrosion and damage.
2. Inspect casing fabric for cuts, tears, abrasions, security of stitching, and other damage.
3. Inspect hook and pile tape for secure attachment and closure.
4. Inspect safety ties on beaded inflation handles. The beaded inflation handle safety ties may be replaced without removing the liferaft from service.
5. Adjust and don backpack to ensure proper fit.
6. If any discrepancy is noted, the raft shall be removed from service and repaired in accordance with procedures in this chapter.

6-23. ACCEPTANCE/CALENDAR/PHASE INSPECTION. The Acceptance/Calendar/Phase Inspection consists of the following tasks:

1. Beaded Inflation Handle Inspection ([paragraph 6-24](#))
2. Container/Case Inspection ([paragraph 6-25](#))
3. Functional Test ([paragraph 6-26](#))
4. Deflation ([paragraph 6-27](#))
5. Visual Inspection ([paragraph 6-28](#))
6. Liferaft Configuration ([paragraph 6-29](#))
7. General Inspection ([paragraph 6-30](#))
8. Markings Inspection ([paragraph 6-31](#))
9. Inflation Assembly Inspection ([paragraph 6-32](#))
10. Beaded Inflation Handle Pull Test ([paragraph 6-33](#))
11. Leakage Test ([paragraph 6-34](#))
12. Records Updating ([paragraph 6-37](#))

13. Repacking ([paragraph 6-61](#))

6-24. BEADED INFLATION HANDLE INSPECTION. Inspect beaded inflation handle for the following:

1. Attachment of inflation lanyard to beaded handle.
2. Corrosion on snap fasteners and ease of operation.
3. Cuts, tears, deterioration, abrasion, stains, and general cleanliness of fabric.
4. Presence of safety tie on beaded inflation handle.

6-25. CONTAINER/CASE INSPECTION. To inspect containers/cases, examine the following:

1. Fabric for cuts, tears, deterioration, and abrasion.
2. Retention tether line for security and wear ([paragraph 6-60](#)).
3. Seams for proper adhesion and stitching.
4. Straps and handles for security and wear.
5. All hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.
6. Liferaft container assembly for stains, dirt and general condition ([paragraph 6-41](#)).

6-26. FUNCTIONAL TEST. To functionally test the LRU-18/U liferaft assembly, proceed as follows:



For liferaft inflation, ensure that there is adequate area free of foreign objects.

1. Open liferaft container assembly, unfold liferaft and lay flat.
2. Actuate inflation assembly.
3. Measure time of inflation; liferaft shall inflate to design shape without evidence of restriction in less than 30 seconds.

4. If raft does not properly inflate, determine cause.

5. Examine liferaft for obvious defects such as cuts, tears, and ruptured seams.

6. If no obvious defects are found, remove the CO₂ inflation valve assembly.

7. Ensure that the check valve assembly is clean, free from foreign matter and not damaged. If check valve assembly is damaged, replace in accordance with [paragraph 6-55](#).

8. Repair inflation valve assembly in accordance with [paragraph 6-54](#).

9. If repairs are made, recheck in accordance with [steps 2](#) and [3](#).

10. Deflate liferaft in accordance with [paragraph 6-27](#). Ensure that all carbon dioxide has been removed.

6-27. DEFLATION. To deflate the LRU-18/U life-raft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Rotary Vacuum (or equivalent)	61E44688 (CAGE 80049)
As Required	Hose, 3/8 or 1/2 inch Diameter, Rubber	—

1. Attach one end of rubber hose to vacuum pump.

NOTE

The vacuum pump hose should be held at an angle to the inflation valve or air will not properly evacuate the cell.

2. Unlock applicable oral inflation valve, hold in open position, and hold vacuum pump hose against end of inflation valve. When cell is collapsed, release oral inflation valve and screw lock closed.

6-28. VISUAL INSPECTIONS. Included under the heading of Visual Inspections are Liferaft Configuration Inspection, General Inspection of liferaft itself,

Markings Inspection of liferaft markings, Inflation Assembly Inspection and Beaded Inflation Handle Pull Test. To perform these inspections, proceed as follows:

CAUTION

Remove CO₂ cylinder prior to inflating liferaft with air.

1. Remove CO₂ cylinder from inflation assembly.
2. Inflate both liferaft cells with air to 1.0 psig.

NOTE

If a suitable air source is not available, water pumped nitrogen (BB-N-411) may be substituted.

6-29. Liferaft Configuration Inspection. The life-raft shall be updated by comparing it to the applicable configuration illustrations in [Figures 6-1 through 6-4](#), [Section 6-2](#) Modifications, and [Section 6-4](#) Illustrated Parts Breakdown.

6-30. General Inspection. To perform the general inspection, inspect the following:

NOTE

If color, location, or stitching patterns of repaired, replaced, or previously incorporated noncritical items or features do not exactly conform to instructions, do not remove or rework item or feature if flotation stability or capability and security of attachment are not comprised.

1. Liferaft fabric for cuts, tears, punctures, deterioration, and abrasion.
2. Seams for proper adhesion.
3. All patches for proper adhesion ([paragraph 6-51](#)).
4. Liferaft base seam for separation.
5. Oral inflation tubes for deterioration ([paragraph 6-53](#)).
6. All hardware for security of attachment, corrosion, damage, wear, and ease of operation.

7. Liferaft for stains, dirt, and general cleanliness (paragraph 6-38).
8. Any other parts for wear or damage.

6-31. Markings Inspection. Compare markings on the liferaft and container assembly to markings shown in [figures 6-3 and 6-4](#). Restore faded markings. Correct any markings which do not agree with the applicable table. To change markings, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Marking Laundry, Black	SPE-92 NIIN 00-161-4229
As Required	Ink, Drawing Waterproof, Yellow	A-A-59291 NIIN 00-634-6583

1. Paint over any incorrect marking, using black waterproof ink.
2. Add correct marking as close as possible to specified location using yellow waterproof ink.

6-32. Inflation Assembly Inspection. To inspect the inflation assembly, proceed as follows:

1. Remove and discard ordnance tape. Loosen setscrew and remove CO₂ cylinder from valve assembly.

NOTE

Do not discard setscrew.

2. Examine inflation device, actuating lever and lanyard for fraying, corrosion, stripped threads, and other damage.
3. If required, remove any sharp edges from valve with a fine round file.
4. Operate actuation lever three or four times. Ensure that lever moves freely and ensure that piercing pin moves properly inside valve body.

NOTE

Each time inflation assembly gaskets or inflation assembly is removed and replaced

for any reason, a function test shall be conducted. Refer to paragraph 6-26. Use new gaskets when replacing device.

5. If any discrepancy is noted in device that is not repairable in accordance with [paragraph 6-54](#), remove assembly and install a new inflation device.

6-33. Beaded Inflation Handle Pull Test. To perform the beaded inflation handle pull test, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Dial Push/Pull Gage, 0 to 50 lb	DPPH50 (CAGE 11710) or equivalent NIIN 00-473-0108

1. Ensure that CO₂ cylinder has been removed. Actuate inflation assembly. All snap fasteners on beaded inflation handle must be fully engaged.
2. Attach gauge to webbing between third and fourth bead on inflation handle.
3. Hold inflator steady. Slowly exert up to a 25 pound straight pull on webbing. All snap fasteners should release at or before 25 pounds.

4. If all snap fasteners do not release at or before the 25 pound limit, inspect male and female snap fasteners for damage. Replace the entire beaded inflation handle assembly if required and repeat [steps 1 through 4](#).

5. If the snap fasteners release properly, leave the pull scale attached, add an additional 25 pound force to check the security of the beaded inflation handle attachment to the inflation lanyard. Examine the lanyard for frays, ruptures, thin spots, split casing and security of stitches and knots. If unsatisfactory, replace the entire beaded inflation handle. Refer to [paragraph 6-56](#).

6-34. LEAKAGE TEST. The LRU-18/U shall be subjected to a leakage test each Calendar/Phase Inspection. To perform a leakage test, proceed in accordance with [paragraph 6-35](#).

Table 6-3. LRU-18/U Liferaft Markings

Marking	Location	Letter Height
LIFERAFT, INFLATABLE, ONE-MAN TYPE LRU-18/U MANUFACTURER [APPLICABLE NAME] CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Outboard side forward end	1/2 inch Yellow (See Note)
<p>ORAL CELL: TO ORALLY INFLATE, UNSCREW KNURLED RING, PUSH VALVE MOUTHPIECE DOWN, AND IMMEDIATELY BLOW THROUGH INLET.</p> <p>CO₂ CELL: TO INCREASE PRESSURE, UNSCREW KNURLED RING, PUSH MOUTHPIECE DOWN, AND IMMEDIATELY BLOW THROUGH INLET.</p>	Inboard starboard side adjacent to respective oral inflation valve	1/4 inch Yellow (See Note)
NOTE: Replacement marking shall be stamped or stenciled using wash-proof yellow ink.		

Table 6-4. LRU-18/U Container Markings

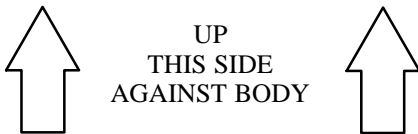
Container	Marking	Location	Letter Height
SRU-37/P One-Man Vee-Bottom Liferaft and Container Assembly (Helo Backpack)	HELICOPTER VEE-BOTTOM ASSEMBLY	Back panel (Beaded Handle Side)	1 inch
	 <p>UP THIS SIDE AGAINST BODY</p>	Front Panel (Webbing belt Side)	1/2 inch
	CONTAINER ASSEMBLY, VEE-BOTTOM LIFERAFT, HELICOPTER MIL-C-81543 TYPE X MANUFACTURE [applicable name] CONTRACT NO. [applicable name] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Inside back panel	1/4 inch
SKK-9 Liferaft and Survival Kit Container Assembly (E-2C)	SURVIVAL KIT LIFERAFT	On Container Front-Lower Section of Backpack Assembly	1 inch

Figure 6-5. Deleted

6-35. Test Fixture. As assembled, test fixtures are not stocked in the supply system; test fixtures must be fabricated to meet the requirements of the schematic shown in [figure 6-6](#). A suggested test fixture, consisting of a three-way valve, pressure gage and adapters, is given in [Chapter 3](#).

NOTE

The LRU-18/U test fixture is equivalent to the life preserver test fixture shown in [Chapter 3](#).

6-36. Test Procedure. To test LRU-18/U Liferraft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Test Fixture	See Chapter 3



Ensure test area is free of foreign objects.

1. Ensure all carbon dioxide and the CO₂ cylinder has been removed from any raft which has been functionally tested.



If 3-way valve is not used, measuring device valve must be closed when air feed valve is open.

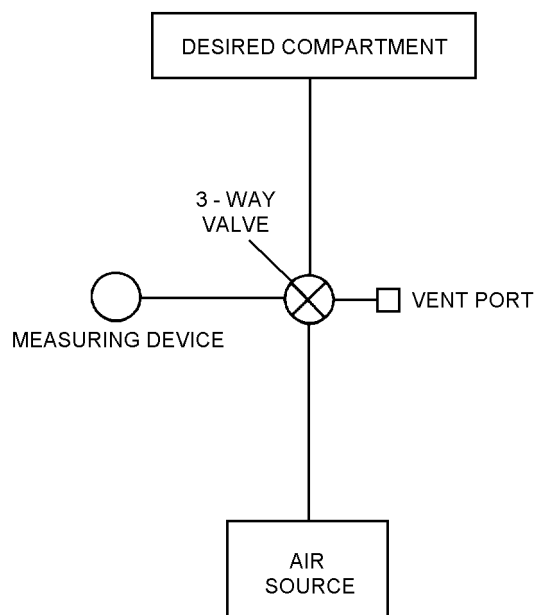


Figure 6-6. Test Fixture Schematic

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NOTE

Refer to [table 6-5](#) for liferaft test pressures. Both cells may be tested simultaneously.

If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

2. Unlock oral inflation valve of CO₂ cell and insert into 1/2-inch diameter rubber hose. Open valve to air supply and inflate liferaft. Alternately position

valve at measuring device, vent, and air supply until proper pressure of 2.0 psig is attained. Repeat procedure for oral cell but inflate to 1.0 psig.

3. The air supply shall be securely shut off. After a minimum of 15 minutes, the pressure shall be re-adjusted in both cells to the leakage test pressures. Record time.

4. Disconnect air supply and check for leaks. Ensure that all valves are closed.

5. Record temperature and barometric pressure and allow liferaft to remain undisturbed for a minimum of 4 hours.

NOTE

If the liferaft has been stacked during the 4-hour inspection period remove from stacking and place in a horizontal position on the floor or table in the inspection area and take test pressure reading. In no event shall the pressure in the raft be determined with another raft stacked upon it.

6. At the end of a minimum of 4 hours after the readjustment period in [step 3](#), record test pressures of both cells.

NOTE

[Steps 7 through 10](#) shall be performed only after leakage test readings have been recorded.

Table 6-5. LRU-18/U Test Pressures

Compartment	Leakage Test Pressure (psig)	Minimum Pressure (psig)
CO ₂ Cell	2.0	1.6
Oral Cell	1.0	0.6

7. Record temperature and pressures for any changes in temperature and barometric pressure. Refer to [tables 6-6](#) and [6-7](#).

EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	- 5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057
UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

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Step 7 - Para 6-36

8. If corrected pressure in CO₂ cell is below 1.60 psig or corrected pressure in oral cell is below 0.60 psig, inflate to leakage test pressure and coat with a soap solution to locate leaks. Mark leak areas. Rinse liferaft with fresh water; air dry and repair in accordance with [paragraphs 6-49](#) and [6-51](#).

Table 6-6. Temperature Conversion Chart

Temperature Difference (°F)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.248
9	0.279
10	0.310
Rise in temperature: subtract from gage reading. Fall in temperature: add to gage reading.	

9. Deflate raft in accordance with [paragraph 6-27](#).

10. Ensure that inflation valve lever is cocked. Ensure CO₂ cylinder has been installed in accordance with [paragraph 6-45](#).

6-37. RECORDS UPDATING. Make necessary entries on appropriate form in accordance with [OPNAV-INST 4790.2 Series](#).

6-38. CLEANING AND SERVICING.

6-39. Cleaning and servicing consists of cleaning the liferaft and containers, and installation of the inflation valve protective covers and CO₂ cylinders.

6-40. CLEANING THE LRU-18/U LIFERAFT. To clean the LRU-18/U liferaft, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint-Free	MIL-C-85043 NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589

CAUTION

Solvents are not to be used in the cleaning of liferafts.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

2. Apply cleaning solution to soiled area with a spray or sponge.

3. Allow solution to remain on surface for several minutes, then agitate with a soft brush or rag.

Table 6-7. Barometric Pressure Conversion Chart

Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368

Rise in pressure: add to gage reading.
Fall in pressure: subtract from gage reading.

4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.

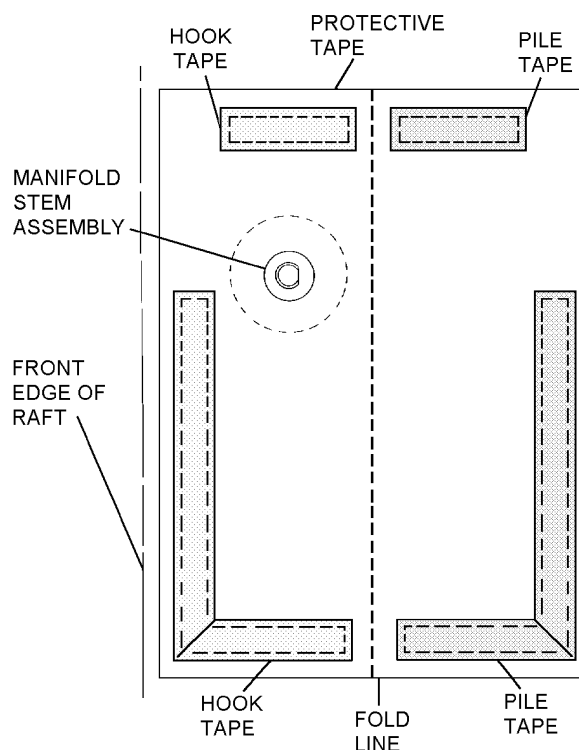
5. Dry liferaft with a lint-free cloth (MIL-C-85043) and apply a light coating of talc (MIL-T-50036A).

6-41. CLEANING OF CASES AND CONTAINERS.

Clean in accordance with [paragraph 6-40](#).

6-42. INSTALLATION OF CO₂ INFLATION ASSEMBLY PROTECTIVE COVER. To install the CO₂ inflation assembly protective cover, proceed as follows:

1. Open liferaft assembly, then position assembly on a flat surface.
2. Remove CO₂ cylinder from valve assembly.
3. Remove inflation valve and gaskets.
4. Place inflation valve protective cover upon the liferaft. Ensure that inlet manifold stem hole is aligned as shown.



Step 4 - Para 6-42

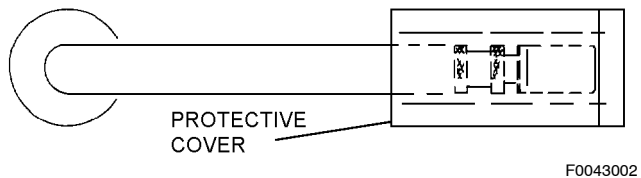
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5. Reinstall inflation valve with new gaskets. Reinstall cap nut onto valve stem and torque to a value of 8 ±1 in-lb.

6. Perform functional test in accordance with [paragraph 6-26](#).

6-43. COVERING OF CO₂ CELL ORAL INFLATION VALVE. To protect the CO₂ cell oral inflation valve, proceed as follows:

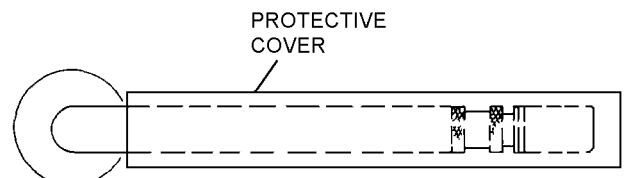
- 1. Ensure that knurled locking ring on the inflation valve is locked.
- 2. Insert inflation valve into the protective pocket attached to raft as shown.



Step 2 - Para 6-43

6-44. COVERING OF ORAL CELL ORAL INFLATION VALVE. To protect the oral cell oral inflation valve, proceed as follows:

- 1. Ensure that knurled locking ring on the inflation valve is locked.
- 2. Slide protective cover over inflation valve.



Step 2 - Para 6-44

6-45. INSTALLATION OF CO₂ CYLINDER. To install a CO₂ cylinder on the liferaft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Scale (gram)	NIIN 00-514-4117 or equivalent
1	Die, Cylinder Thread Chaser	1842-008-01 (CAGE 03688)
1	Seat Seal	849AML NIIN 00-113-8290
1	Cylinder, CO ₂	NIIN 00-837-3322

NOTE

Weight will vary according to manufacturer.

- 1. Ensure that knurled locking ring on the inflation valve is locked.
- 2. Weigh a charged CO₂ cylinder (1521AS102-7, MIL-C-52053TC, 56.7 grams) and compare the minimum stamped weight with the scale weight. Discard and replace cylinder if scale weight is 2 grams less than minimum stamped weight.
- 3. Ensure that inflator lever is in a cocked position.
- 4. To assure a firm cylinder seat, conduct a cylinder thread count. Threaded portion of cylinder neck shall contain a minimum of seven full threads to assure a firm cylinder seat within valve body. Any cylinder found with less than seven full threads shall be discarded. (See figure 6-7.)

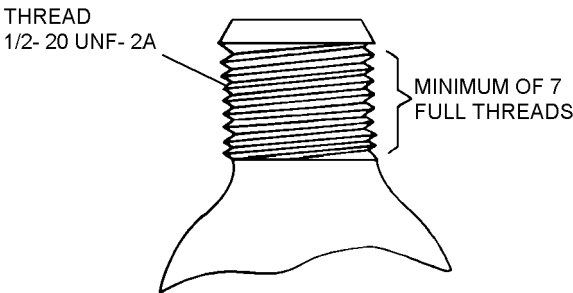


Figure 6-7. Cylinder Thread Count

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CAUTION

Steel threads on CO₂ cylinder can cause damage to aluminum threads on inflator if cylinder is not carefully threaded. If binding occurs during threading, replace cylinder.

5. Using the cylinder thread chaser die, turn the thread chaser to the full extent of the threads on the CO₂ cylinder to cut free any excessive plating covering the threads.

6. Install new seat seal into inflator. Install CO₂ cylinder into inflator body as far as hand twisting will permit.

7. Deleted.

8. Deleted.

6-46. REPAIR/REPLACEMENT.

6-47. This section contains instructions for the repair or replacement of various components or subassemblies of the LRU-18/U liferaft to ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for minor parts which are defective, corroded or worn and require replacement are included in the applicable paragraph of this section. Otherwise, refer to [Section 6-4](#). All repairs shall be documented by making necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

6-48. Replacement of easily removed assembly components such as CO₂ inflation valves are authorized in addition to repair and replacement procedures documented in this section. The liferaft shall be sub-

jected to a functional and leakage test each time CO₂ inflation valves are removed and replaced for any reason, and each time inflation valve gaskets are replaced.

6-49. DETERMINATION OF REPAIRABILITY. The LRU-18/U liferaft shall be considered beyond repair for any of the following reasons.

1. Porous fabric areas on tubes.
2. Split or open tube seams.
3. Leakage test failure resulting from other than repairable cut, tear or puncture.
4. Holes, cuts, tears or punctures within 1 inch of tube seams.
5. Damaged, malfunctioning, or excessively corroded inlet valve, manifold assembly, oral inflation valves, or oral inflation tubes.
6. Holes or abrasions exceeding 1 inch in length or diameter on tubes.
7. Oral inflation or inlet valve stem separating from the fabric.
8. Deterioration of the nylon fabric caused by oil, grease, or any other foreign substance.
9. Deterioration of the nylon fabric caused by an excessive mildewed condition.
10. In the judgement of a competent inspector, requiring excessive repair.

6-50. CEMENTING THE LRU-18/U LIFERAFT. To cement the liferaft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620 NIIN 00-243-9401

Materials Required

Quantity	Description	Reference Number
1	Disposable Brush	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
As Required	Adhesive, Polyurethane	UR-1092 NIIN LH-000-1650
As Required	Talc, Technical	MIL-T-50036A NIIN 01-089-9589

1. Place liferaft on a flat surface.



Do not use toluene near open flame, or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well ventilated area.



Toluene shall be the only solvent used in the fabrication or repair of this assembly. Do not use methyl ethyl ketone (MEK) to clean the LRU-18/U liferaft. MEK will break down the polyurethane coating on the inside surface of the raft. Always use solvent sparingly and wipe up excess solvent; do not allow to dry by evaporation.

Only polyurethane adhesives and polyurethane-coated cloth and patches shall be used on LRU-18/U liferaft assemblies.

2. Clean both surfaces to be cemented with four applications of toluene. Apply toluene with back-and-

forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow areas to dry between applications.

3. Prepare cement and accelerator mixture. Prepare only enough mixture for 8 hours use, as this is the effective active period for this mixture. Dispose of any remaining mixture at this time.

4. Using a small disposable brush, apply cement to completely cover surfaces to be cemented. Use long, one direction strokes and complete each surface before cement becomes tacky as the brush may pull tacky cement from the surface. Allow to dry for 10 minutes.

5. Apply a second coat of cement as in step 4. Use brush strokes perpendicular to the original direction.

6. When second coat of cement has become tacky, place pieces together. If cemented area has a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden or rubber roller. Inspect for proper application/cement.

7. Place a small weight over cemented area and allow to cure for a minimum of 48 hours.

8. Dust area with talc (MIL-T-50036A).

6-51. PATCHING THE LRU-18/U LIFERAFT. Patching of the LRU-18/U liferaft shall be performed as follows:

NOTE

Holes, cuts, tears, or punctures over 1-inch square are considered non-repairable on the LRU-18/U liferaft.

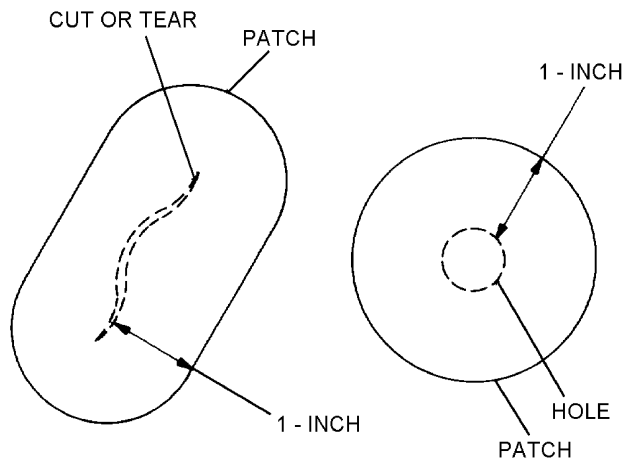
Materials Required

Quantity	Description	Reference Number
As Required	Polyurethane-coated nylon cloth, Type I	MIL-C-83489 NIIN 01-335-3129



Only polyurethane adhesives and polyurethane-coated cloth and patches shall be used on LRU-18/U liferaft assemblies.

1. Cut a rounded patch 1 inch larger than damage on all sides.



F0051001

Step 1 - Para 6-51

2. Center patch over damaged area and trace an outline of patch on fabric.
3. Cement patch to damaged area in accordance with [paragraph 6-50](#).
4. Dust area with talc (MIL-T-50036A).
5. Perform leakage test in accordance with [paragraph 6-34](#).

6-52. INSPECTION RECORD PATCH.

NOTE

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life-rafts. The requirement for all other record documentation remains unchanged. The reason for this change is that most Inspection Record Patches are unreadable, and the packer's and inspector's names, including the type of inspection (leak/functional), are documented on Aviation Crew Systems Records.

6-53. REPLACEMENT OF ORAL INFLATION VALVE.

To replace the oral inflation valve, proceed as follows:

NOTE

Replacement oral inflation valves can only be obtained through salvage of BCM'ed or surveyed inflatable survival equipment.

Materials Required

Quantity	Description	Reference Number
1	Valve, Oral Inflation	—
As Required	Cement, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Brush, Disposable	NIIN 00-514-2417
As Required	Toluene	T-T-548 NIIN 00-281-2002
-or-		
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762



Only toluene or MEK shall be used to clean oral inflation valve and tube. Only polychloroprene cement (MIL-T-5540, NIIN 00-142-9913) shall be used to cement oral inflation valve into oral inflation tube.

- 1. Carefully cut through metal clamp securing oral inflation valve to oral inflation tube and remove the metal band and oral inflation valve.
- 2. If the oral inflation tube was damaged during removal of valve, trim off damaged section.
- 3. Clean both surfaces to be cemented with toluene or MEK. Allow areas to dry.
- 4. Using a small disposable brush, carefully apply a small amount of polychloroprene cement to the surfaces of the tube and the valve which are to be cemented together.
- 5. Immediately place oral inflation valve into oral inflation tube. Oral inflation valve should be inserted up to valve shoulder. Inspect for proper application/cement.
- 6. Tightly wrap the cemented portion of the oral inflation tube with cord or wire and allow to cure for 48 hours before removing wrap.
- 7. Perform leakage test in accordance with [paragraph 6-34](#).

6-54. REPLACEMENT OF CO₂ INFLATION VALVE. To replace the MIL-I-23145 Type II to comply with ACC 660, or to replace a damaged or defective 840-AMLS proceed as follows:

Materials Required		
Quantity	Description	Reference Number
1	Pneumatic Inflator Valve	840-AMLS (CAGE 98021) NIIN 01-218-6737

Materials Required (Cont)

Quantity	Description	Reference Number
1	Valve Stem Kit (Note 1)	105AS100-6 NIIN 00-113-8290
1	Seat Seal	849AML NIIN 00-113-8290

Notes: 1. Kit contains one top and one bottom gasket.

- 1. Remove CO₂ cylinder from CO₂ inflation valve if installed. Remove inflation lanyard with beaded handle from inflator valve. Unscrew and remove cap nut on valve stem.
- 2. Retain CO₂ cylinder, inflation lanyard with beaded handle and valve stem cap nut for reinstallation.
- 3. Remove top gasket, inflator valve and bottom gasket and discard.
- 4. Reinstall inflation lanyard with beaded handle onto new inflator (840-AMLS) valve. Pass the beaded handles lanyard loop through the hole in the actuator lever on the inflation assembly.
- 5. Install new bottom and top gaskets from gasket kit by first placing the bottom gasket (small internal diameter (ID)) on valve stem. Place inflation valve protective cover over valve stem in accordance with [paragraph 6-42 step 4](#). Install new inflator valve onto valve stem, actuation lever shall be in an up pull with hole for CO₂ bottle facing bottom of raft, ensure protective cover is not pinched between inflator and valve stem. Install new top gasket (large ID).
- 6. Reinstall cap nut onto valve stem and torque to a value of 8 ± 1 in-lb.
- 7. Perform functional check of inflation valve in accordance with [paragraph 6-26](#).
- 8. Deleted
- 9. Deleted

Figure 6-8. Deleted

6-55. REPLACEMENT OF PNEUMATIC INFLATOR VALVE (CHECK VALVE) ASSEMBLY. To replace a defective check valve assembly, proceed as follows:

Support Equipment Required

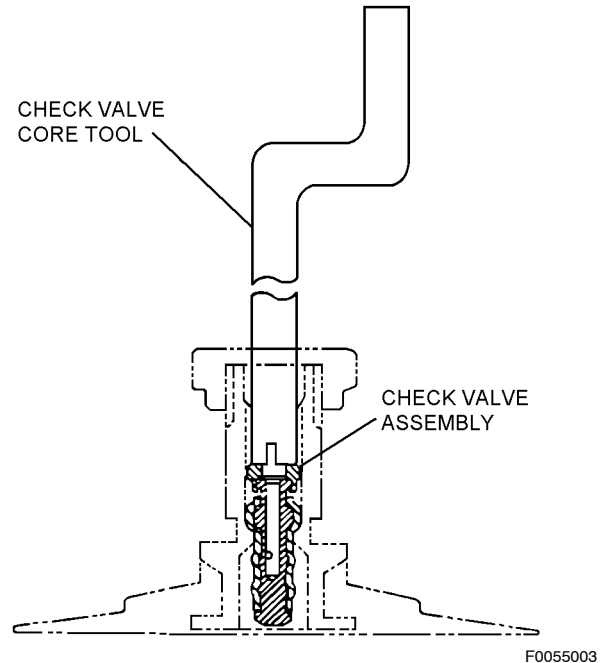
Quantity	Description	Reference Number
1	Valve, Pneumatic Inflator (Check Valve Assembly)	Schrader-Bridgeport P/N 768 (Note 1)
1	Tool, Valve Core	318M0007P001 NIIN 00-308-3809 or equivalent
1	Wrench, Torque	—

Notes: 1. Schrader-Bridgeport P/N 768 must be open purchased from:
Schrader-Bridgeport Intl
205 Frazier Rd
P.O. Box 668
Altivista, VA 24517
Phone 804-369-8826

1. If not available, fabricate a check valve core tool as shown in [Chapter 3](#).

2. Remove inflator cap nut.

3. Insert valve core tool and unscrew check valve from valve stem.



Step 3 - Para 6-55

4. Insert new check valve in valve stem and tighten with valve core tool hand tight, ensuring that check valve is not Pam type core.

5. Replace cap nut and torque to a value of 8 ± 1 in-lb.

6. Perform a functional and leakage test on the liferaft CO₂ cell in accordance with [paragraph 6-26](#) and [6-34](#).

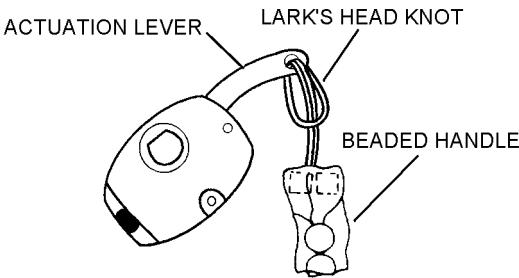
6-56. REPLACEMENT OF BEADED INFLATION HANDLE ASSEMBLY. To replace the beaded inflation handle, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Handle, Beaded Inflation	975AS121-12
As Required	Thread, Nylon Size E	V-T-295 NIIN 00-204-3884

NAVAIR 13-1-6.1-1

- 1. Ensure that inflation assembly will not actuate by removing CO₂ cylinder.
- 2. Remove inflation lanyard from inflation assembly.
- 3. Pass the beaded handle's lanyard loop through the hole in the actuation lever on the CO₂ inflation assembly.



F0056006

Step 3 - Para 6-56

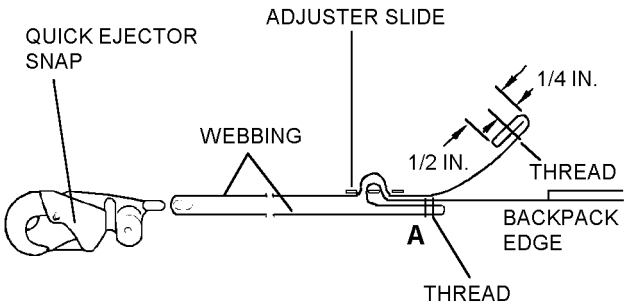
- 4. Form a lark's head knot and pull tight.
- 5. Perform Beaded Inflation Handle pull test in accordance with paragraph 6-33.
- 6. Recock CO₂ inflator and reinstall CO₂ cylinder.
- 7. Pack liferaft in accordance with paragraph 6-61.

6-57. REPLACEMENT OF QUICK EJECTOR SNAP (SRU-37/P). To remove and replace the quick ejector snap, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884
1	Ejector Snap	MS22017-1

- 1. Carefully cut stitching at 'A' and remove defective ejector snap by unreeving webbing belt from adjuster slide and ejector snap.
- 2. Inspect adjuster slide and replace if corroded.
- 3. Inspect replacement ejector snap for proper operation.
- 4. Reeve webbing through adjuster slide and ejector snap, and restitch as shown.



F0057004

Step 1 and 4 - Para 6-57

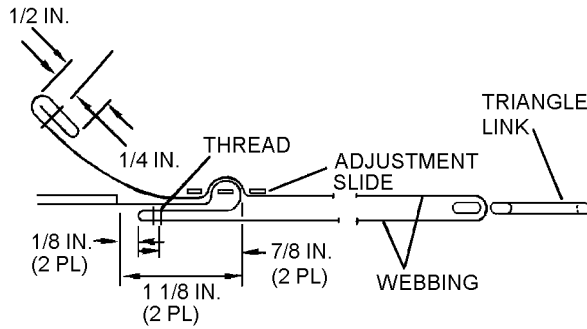
6-58. REPLACEMENT OF TRIANGLE LINK (SRU-37/P). To remove and replace the triangle link, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884
1	Triangle Link	MS22020-1

- 1. Carefully cut stitching at 'A' and remove defective triangle link by unreeving webbing belt from adjuster slide and triangle link.
- 2. Inspect adjuster slide and replace if corroded.
- 3. Inspect replacement triangle link for any damage or corrosion.

4. Reeve webbing through adjuster slide and triangle link, and restitch as shown.



Step 1 and 4 - Para 6-58

F0058004

6-59. FABRICATION OF PROTECTIVE COVER.

To fabricate a protective cover for the CO₂ inflation assembly, proceed as follows:

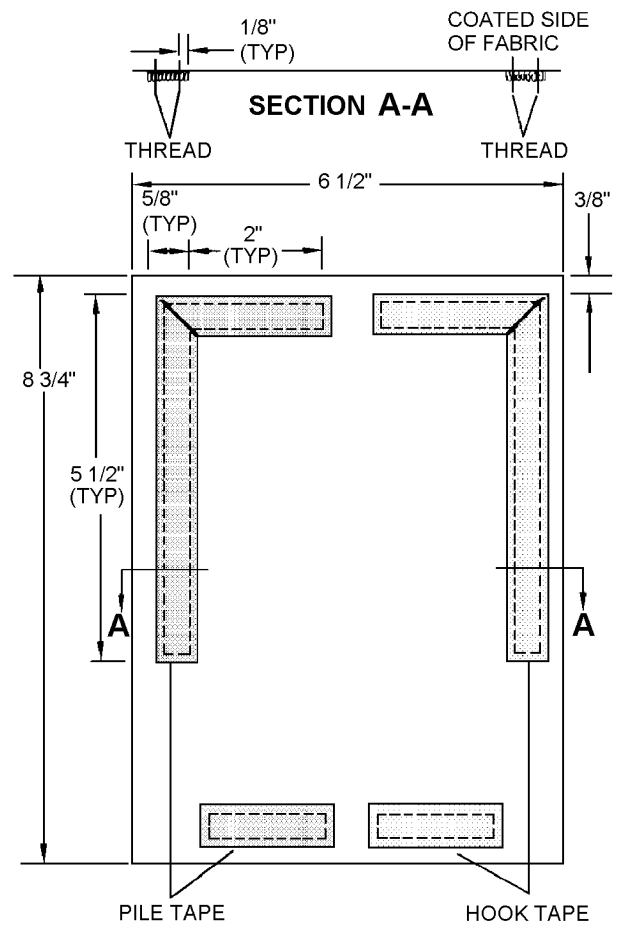
Support Equipment Required

Quantity	Description	Reference Number
1	Punch, Cutting, Type 1, Class B Style 1, Size 9	GGG-P-833A NIIN 00-180-0925

Materials Required

Quantity	Description	Reference Number
8 3/4 x 6 1/2 inches	Polyurethane-coated nylon cloth, Type I	MIL-C-83489 NIIN 01-335-3129
10 x 5/8 inches	Fastener Tape, Hook, Type II, Synthetic, Black	MIL-F-21840 NIIN 00-935-6762
10 x 5/8 inches	Fastener Tape, Pile, Type II, Synthetic, Black	MIL-F-21840 NIIN 00-935-6763
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

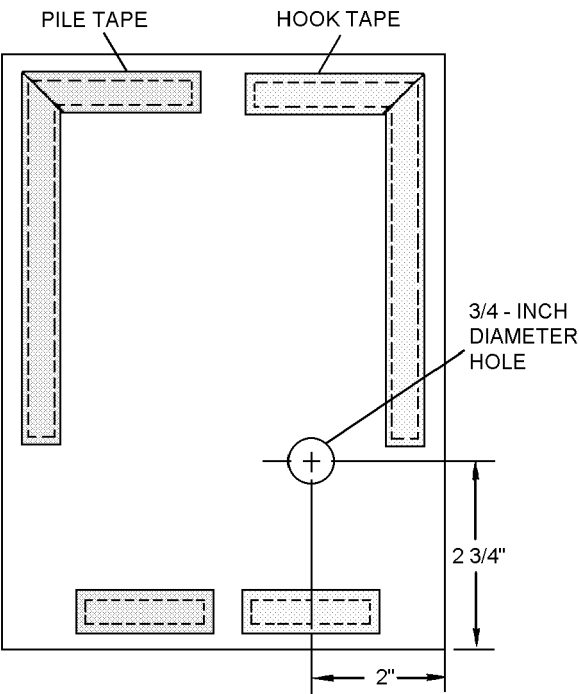
1. Cut one 5 1/2-inch length and two 2-inch lengths of hook and pile tape. Sew to the coated side of the coated nylon cloth. Use stitch type 301 stitching 8 to 10 stitches per inch.



Step 1 - Para 6-59

F0059001

2. Position coated nylon cloth, coated side up, over cutting board and punch a 3/4-inch hole.



Step 2 - Para 6-59

F0059002

6-60. FABRICATION OF TETHER LINE (SRU-37/P). To fabricate a retaining line for the (SRU-37/P) Helicopter Backpack, proceed as follows:

Materials Required

Quantity	Description	Reference Number
6 feet	Webbing Nylon, Type II, 1 inch, Yellow	MIL-W-4088 NIIN 00-262-1643
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

1. Fold webbing to dimensions shown in figure 6-9, and stitch as shown using size E nylon thread (V-T-295, Type II), 8 to 10 stitches per inch. Back-stitch a minimum 1/2 inch.

6-61. PACKING LRU-18/U LIFERAFT.

6-62. This section contains information on packing the LRU-18/U in the SRU-37/P helicopter backpack. Information on packing the LRU-18/U in the E-2C SKK-9 container assembly can be found in NAVAIR 13-1-6.3-1. Packing of the LRU-18/U liferaft shall be carried out by qualified personnel at the intermediate level of maintenance or above. Cleaning and servicing instructions may be found in [paragraph 6-38](#).

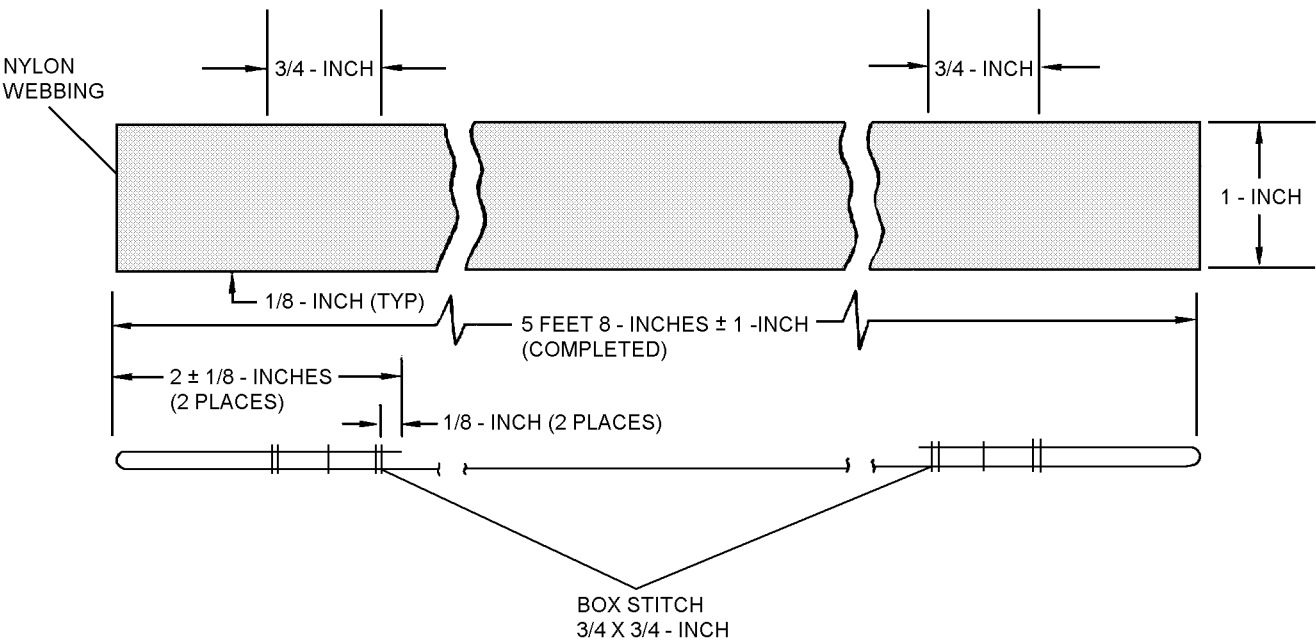


Figure 6-9. Tether Line Assembly

10060009

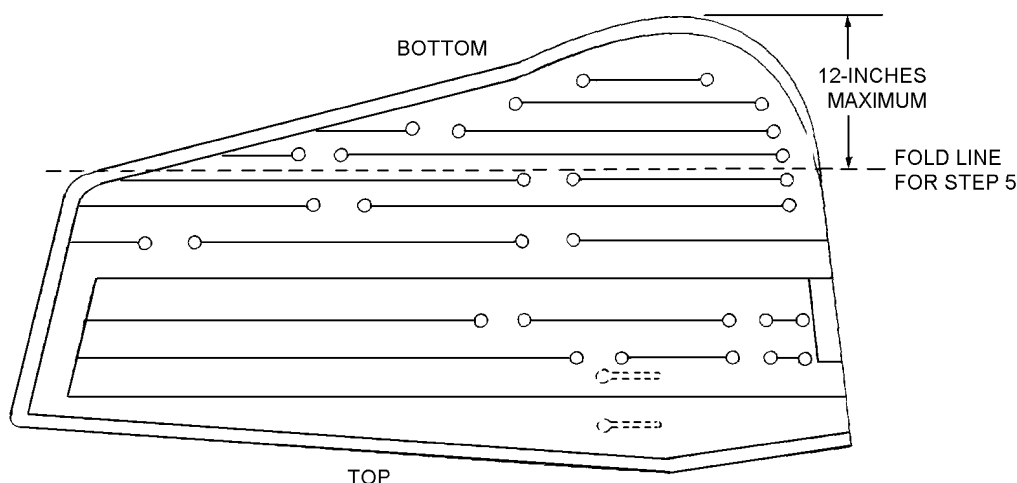
6-63. PACKING LRU-18/U LIFERAFT IN SRU-37/P HELICOPTER BACKPACK. To pack an LRU-18/U liferaft in an SRU-37/P helicopter backpack, proceed as follows:

1. Ensure liferaft and back pack have been inspected in accordance with paragraph 6-14.

2. Prior to packing, ensure that both cells have been thoroughly deflated. Ensure oral inflation valves are locked then placed in protective pockets. Refer to paragraphs 6-43 and 6-44.

3. Ensure CO₂ cylinder is properly installed and seated in accordance with paragraph 6-45 and that beaded inflation handle is properly attached to actuation lever in accordance with paragraph 6-56. Cover CO₂ inflation assembly with anti-chafing cover.

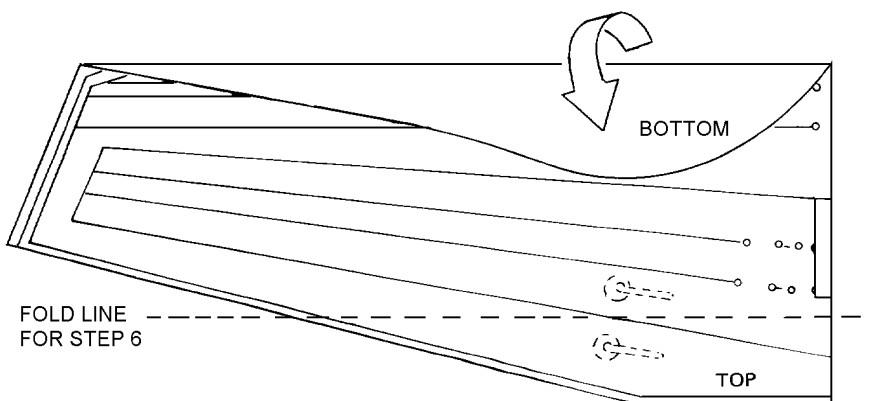
4. Lay the liferaft on the packing table as shown below and lightly dust entire raft with talc (MIL-T-500036A). Note fold line for the next step (one inch below the fourth seal line). For simplicity, the beaded handle is omitted in the following folding diagrams.



Step 4 - Para 6-63

F0063004

5. Fold bottom over and down, as shown below. Note the fold line for the next step.

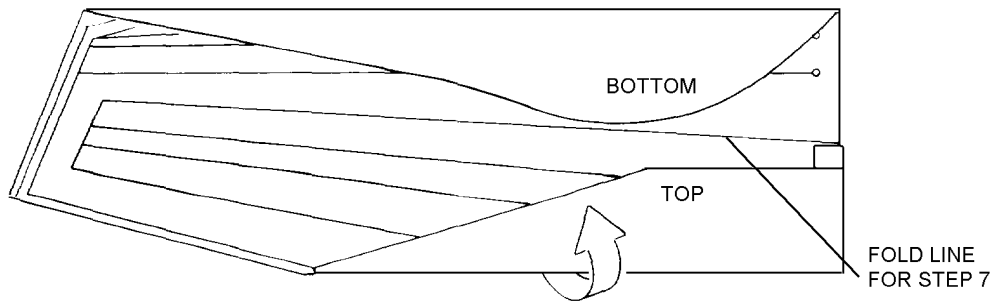


Step 5 - Para 6-63

F0063005

NAVAIR 13-1-6.1-1

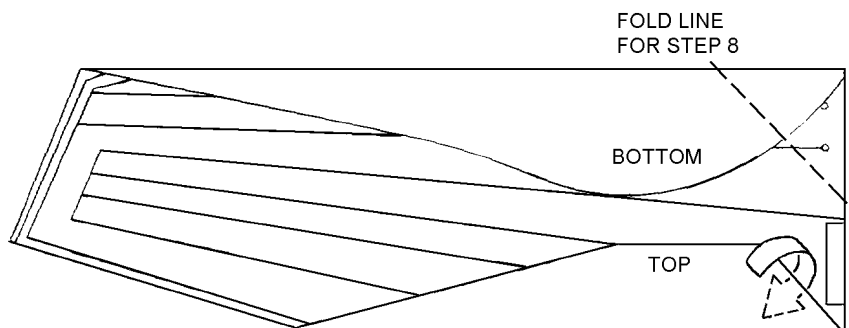
6. Fold top over and up and note fold line for the next step.



Step 6 - Para 6-63

F0063006

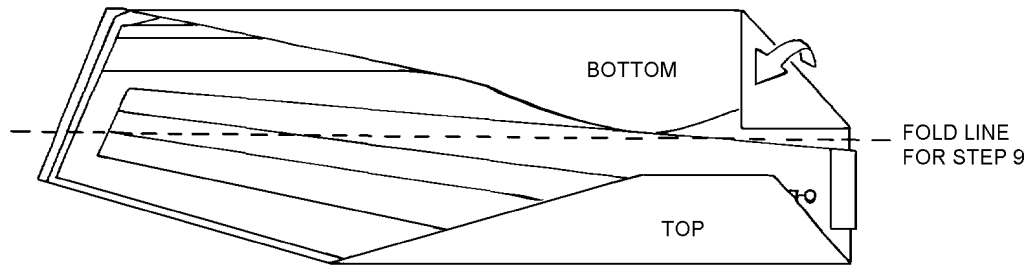
7. Tuck flap under as shown below to uncover the CO₂ inflation assembly. Note fold line for the next step.



Step 7 - Para 6-63

F0063007

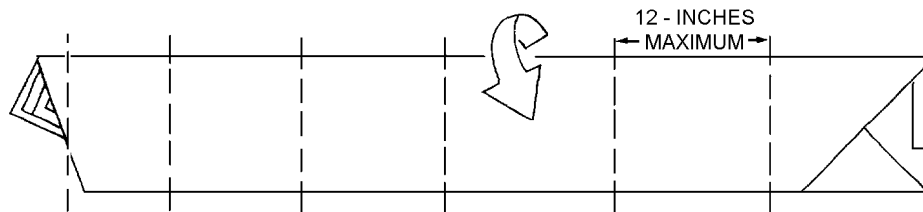
8. Fold the top right corner of the bottom down as shown, and note the fold line for the next step is halfway between the top and bottom.



Step 8 - Para 6-63

F0063008

9. Fold down bottom as shown and note the fold lines to complete the folding. The width of the folded raft should not exceed 12 inches.

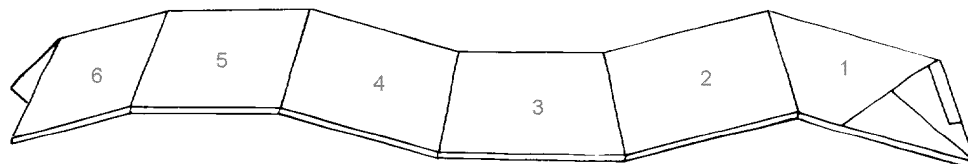


Step 9 - Para 6-63

F0063009

10. Step 10 is the perspective, partially folded view of [step 9](#). [Steps 11 through 14](#) indicate the proper folding method. The packer shall ensure that

the overall width of the panels, when folded, does not exceed 12 inches. Note the numbers assigned to the panels.

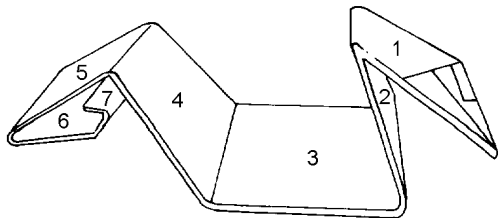


Step 10 - Para 6-63

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NAVAIR 13-1-6.1-1

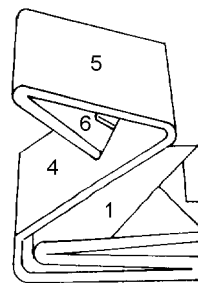
11. Fold panels 1 through 7 as shown.



Step 11 - Para 6-63

F0063011

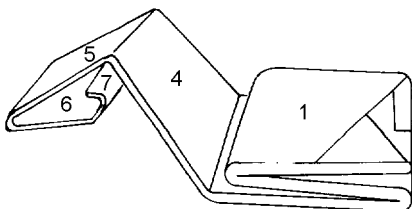
13. Fold panel 4 over panel 1, then proceed to close panel 5 over panels 6 and 7.



Step 13 - Para 6-63

F0063013

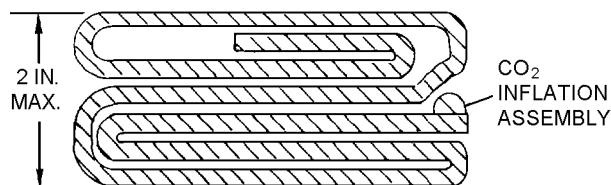
12. The top panel (panel 1) shall cover panels 2 and 3.



Step 12 - Para 6-63

F0063012

14. Shown is an exaggerated end-view of the raft, folded as required for proper fit and optimum performance. The overall height when compacted shall not exceed 2 inches.

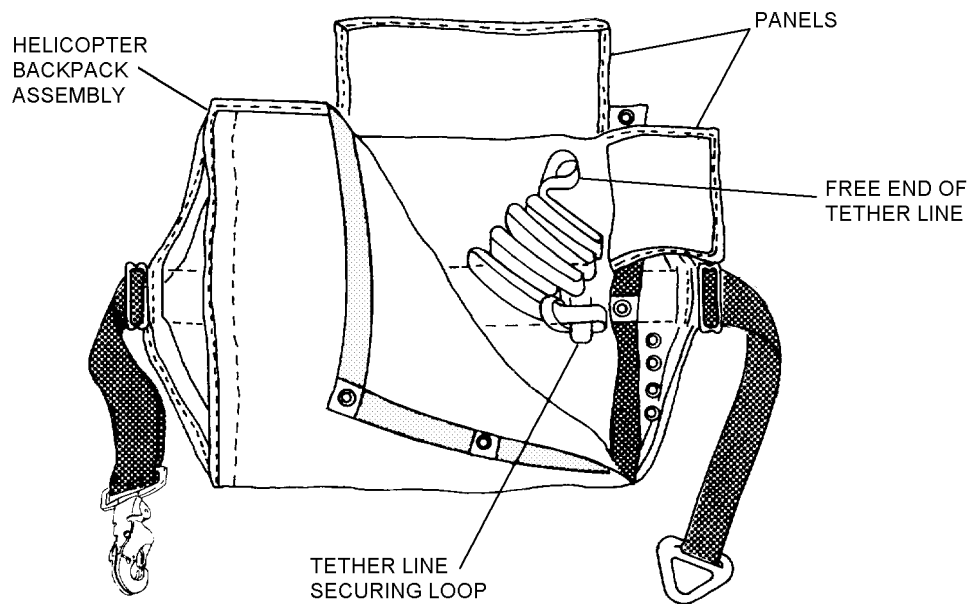


Step 14 - Para 6-63

F0063014

15. Place the helicopter backpack on the table as shown so that the panels are open and the outside

facing of the backpack is folded back so to allow for insertion of the liferaft.

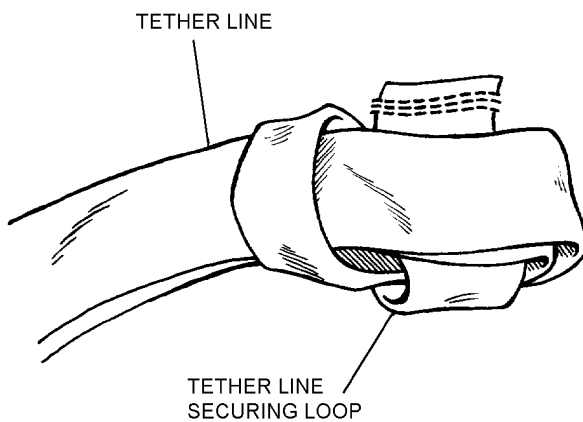


Step 15 - Para 6-63

F0063015

16. Secure the tether line to the securing loop with a lark's head knot.

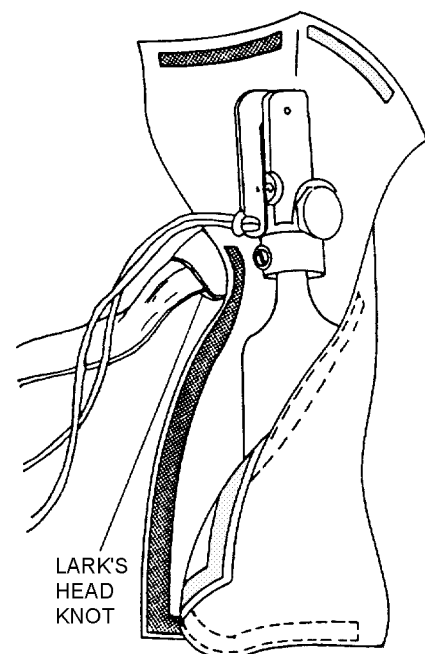
turns of waxed, size 6 cord, single. Tie the ends of the thread with a surgeon's knot, followed by a square knot.



Step 16 - Para 6-63

F0063016

17. Form a lark's head knot on the free end of the tether line large enough to pass over the entire CO₂ inflation assembly (between the anti-chafing cover and the liferaft). Tighten the knot around the manifold stem. This knot will lie between the raft and the CO₂ inflation assembly. Tack the knot with two



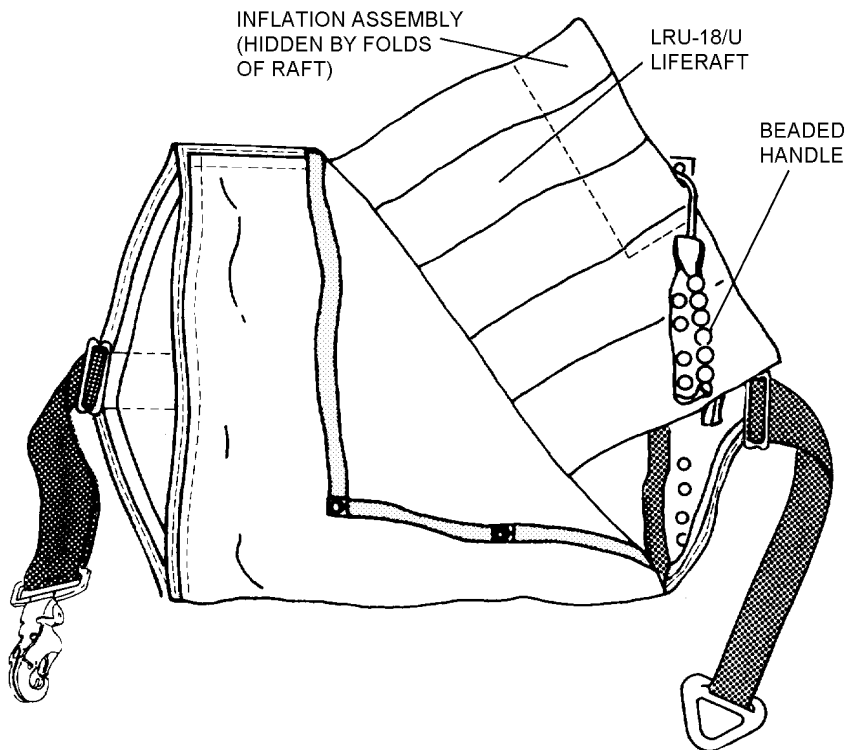
Step 17 - Para 6-63

F0063017

NAVAIR 13-1-6.1-1

18. Fold the tetherline in bights of approximately six inches, secure with a rubberband and stow to the left of the CO₂ inflation assembly, between panels 1 and 4. Allow enough slack in the tether, between the raft and the securing loop, to allow for the insertion

of the raft into the pouch of the container assembly. Insert the raft, as shown, forcing it firmly into the pouch with the CO₂ inflation assembly on the upper right hand side.

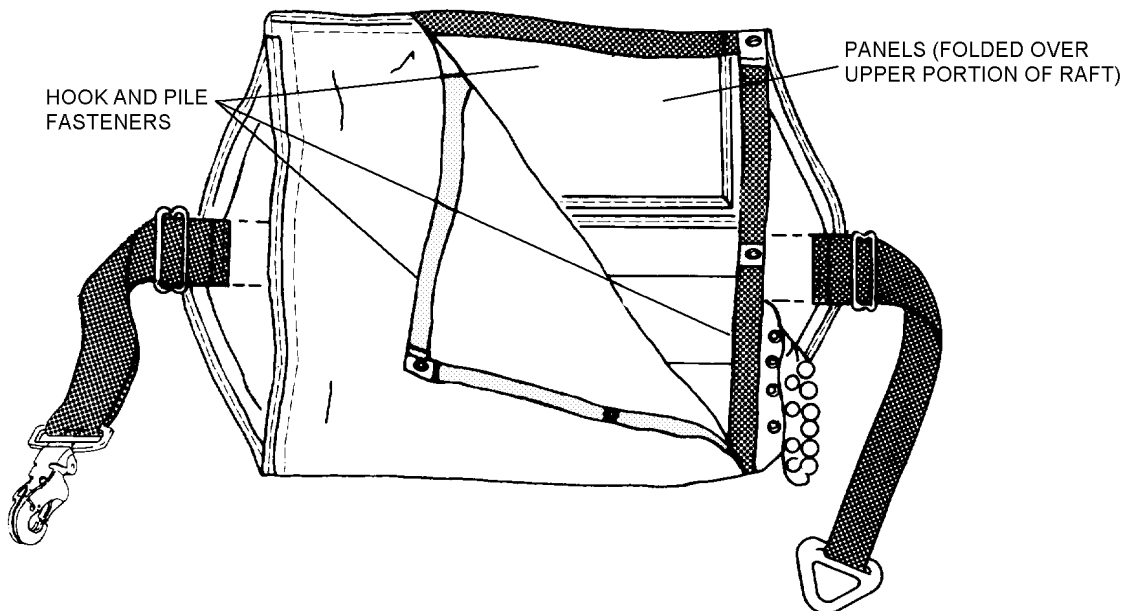


F0063018

Step 18 - Para 6-63

19. Cover the upper right and top portions of the raft with the container panels as shown and ensure that the beaded inflation handle lanyard is placed

above the center snap fastener before securing the hook and pile facing and the two snaps of the container facing.

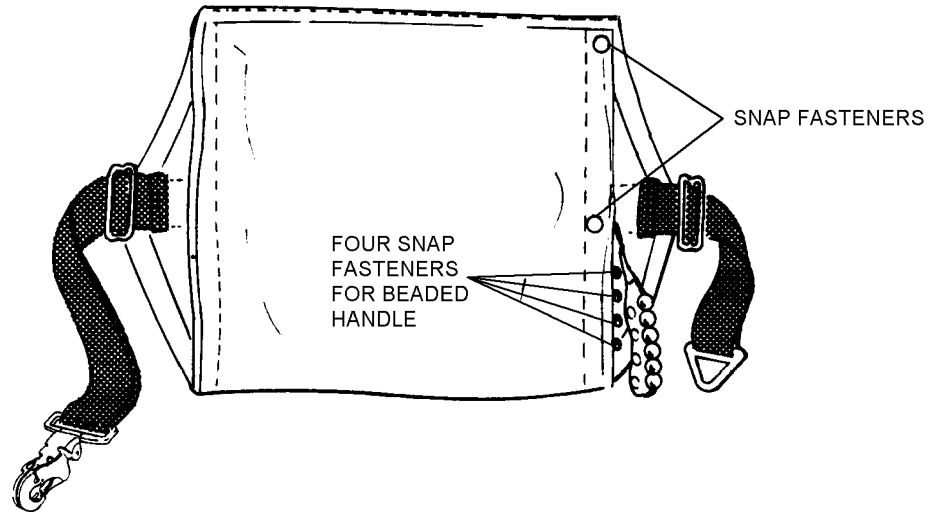


F0063019

Step 19 - Para 6-63

20. Secure cover with the hook and pile fasteners and the two snap fasteners, then snap the beaded

inflation handle to the four snap fasteners (shown unfastened).



Step 20 - Para 6-63

F0063020

21. Safety tie beaded inflation handle with turn of size E nylon thread single. Draw thread sufficiently to permit a $1/2 \pm 1/8$ -inch space between the middle beads and webbing. Tie off ends with a surgeon's knot followed by a square knot.

22. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

Section 6-4. Illustrated Parts Breakdown (IPB)

6-64. GENERAL.

6-65. This section lists and illustrates the assemblies and detail parts of the LRU-18/U Liferaft.

6-66. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

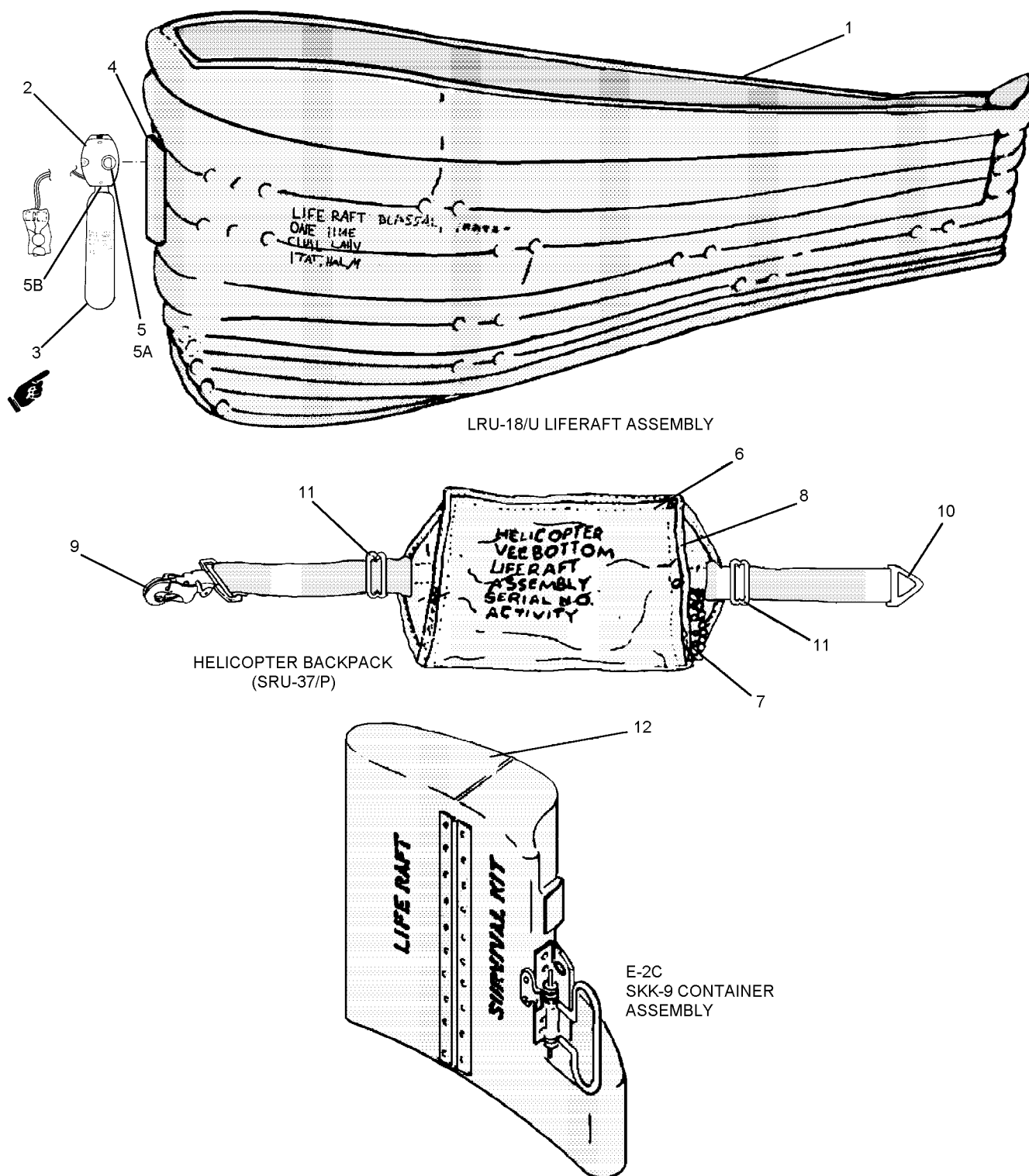


Figure 6-10. LRU-18/U Liferaft Assembly

10060010

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
6-10		LRU-18/U LIFERAFT ASSEMBLY	REF	
-1	1521AS102-1	. LIFERAFT, One-man, Inflatable	1	
-2	840-AMLS	. . INFLATION VALVE ASSEMBLY	1	
-3	MIL-C-52053A	. . . CO ₂ CYLINDER (2 OZ.)	1	
-4	768	. . . CHECK VALVE ASSEMBLY (Note 2)	1	
-5	105AS100-3	. . . GASKET, Top (Note 1)	1	
-5A	105AS100-4	. . . GASKET, Bottom (Note 1)	1	
-5B	849AML	. . . SEAT SEAL	1	
-6	133AS111-11	. HELICOPTER BACKPACK ASSEMBLY	1	
-7	975AS121-12	. . BEADED INFLATION HANDLE	1	
-8	1332AS114-1	. . TETHER LINE	1	
-9	MS22017	. . QUICK-EJECT SNAP	1	
-10	MS22020-1	. . TRIANGLE LINK	1	
-11	MS90297-1	. . BUCKLE (Adjuster Slides)	1	
-12	123AB50512-3	. E-2C SKK-9 CONTAINER ASSEMBLY	1	
	Notes: 1. Top and bottom gaskets are obtained from valve stem kit P/N 105AS100-6, NIIN 00-113-8290 which contains one top and one bottom gasket. 2. Schrader-Bridgeport P/N 768 must be open purchased from: Schrader-Bridgeport Intl 205 Frazier Rd P.O. Box 668 Altivista, VA 24517 Phone 804-369-8826			

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code	Part Number	Figure and Index Number	SM&R Code
MIL-C-52053TC	6-10-3	PAGZZ	1332AS111-11	6-10-6	PAGGG
MS22017	6-10-9	PAOZZ	133AS114-1	6-10-8	XAGGG
MS22020-1	6-10-10	PAOZZ	1521AS102-1	6-10-1	PAGGG
MS90297-1	6-10-11	PAOZZ	768	6-10-4	PAGZZ
105AS100-3	6-10-5	PAGZZ	840-AMLS	6-10-2	PAGZZ
105AS100-4	6-10-5A	PAGZZ	849AML	6-10-5B	PAGZZ
123AB50512-3	6-10-12	AG---	975AS121-1	6-10-7	PAGZZ

CHAPTER 7

LRU-29/P22P-20 SEALED LIFERAFT ASSEMBLY

Section 7-1. Description

7-1. GENERAL.

7-2. The LRU-29/P22P-20 Sealed Liferaft Assembly is a vacuum packaged one-person liferaft utilized in the A/P22P-20 Crew Backpack Assembly. It is intended for use by an aircrew member forced down at sea. It can also be used when forced down over land for crossing rivers and streams or for shelter. See [figure 7-1](#) and [figure 7-2](#).

7-3. CONFIGURATION.

7-4. The LRU-29/P22P-20 Sealed Liferaft Assembly is a vacuum packaged LRU-16/P. The raft is re-designated after vacuum packaging by the manufacturer of the A/P22P-20 Crew Backpack Assembly. It consists of a FLU-10 zero leak inflator, and a one person liferaft constructed of polyurethane coated nylon fabric that is assembled using radio frequency (heat sealed) welding techniques. The liferaft comes with an inflatable floor and weather shield for insulation from the elements. The liferaft is stowed in the SRU-41/P22P-20 Survival Equipment Kit Assembly of the A/P22P-20 Crew Backpack Assembly and is tethered to the assembly via a lanyard. The liferaft is manufactured with lusterless blue colored nylon cloth.

7-5. MAJOR COMPONENTS.

7-6. FLOATATION CHAMBER. The main floatation platform of the LRU-29/P22P-20 consists of two fabric panels welded to form the floatation chamber. The inflatable floor and canopy are welded to the main body to complete the structure of the raft. Installed accessories include:

1. FLU-10 zero leak inflator, which is attached to the liferaft via an inlet valve.
2. Oral inflation valve for adjusting liferaft pressure or for inflating liferaft should the bottle fail.

3. Boarding handles.
4. Ballast bags (provide stability).
5. Sea anchor (attached to main tube).

7-7. INFLATABLE FLOOR. The floor of the LRU-29/P22P-20 consists of two layers of fabric welded to the bottom of the main floatation tube. The layers are uniformly spot welded in regularly spaced circular welds to form the inflation chamber for the floor. The floor is inflated through an attached oral inflation tube. Installed accessories include:

1. Oral inflation valve.
2. Boarding and righting handles.
3. Floor patch for securing survival equipment.

7-8. CANOPY. The canopy (weather shield) of the LRU-29/P22P-20 is constructed similar to the floor so it can be inflated to provide protection from the elements. When inflated it can be secured in the closed position with Velcro. The inside of the raft canopy is made with International Orange cloth for use in signaling. Installed accessories include:

1. Stowage pocket located on outside for strobe light.
2. Canopy oral inflation tube.
3. Velcro closure for sealing canopy.

7-9. APPLICATION.

7-10. The LRU-29/P22P-20 Liferaft Assembly is only authorized for use in the A/P22P-20 Crew Backpack Assembly used in the E-2C.

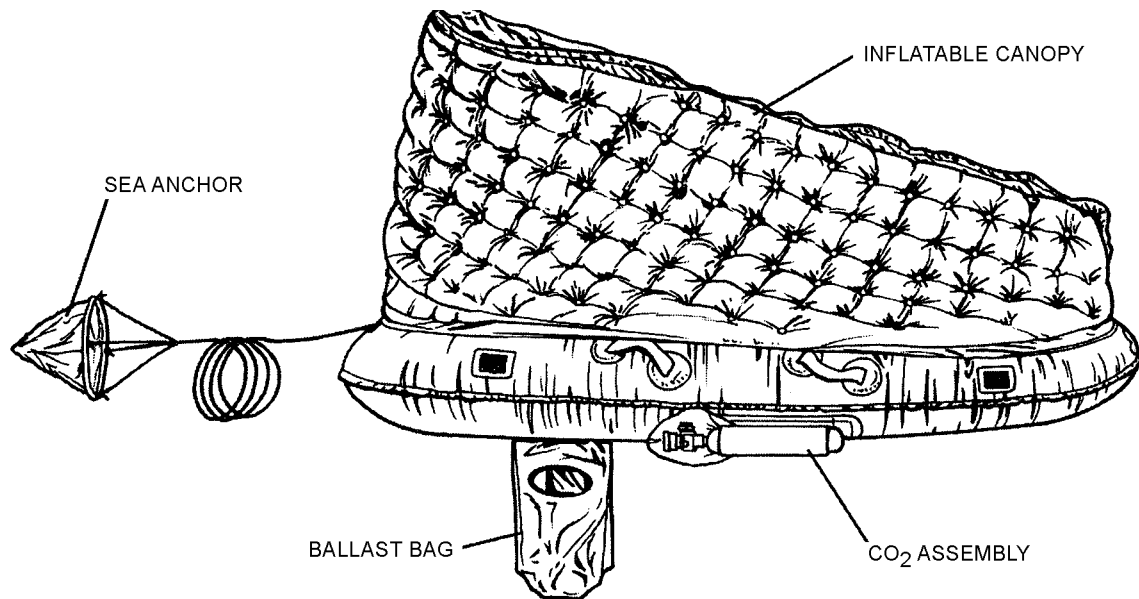


Figure 7-1. LRU-29/P22P-20 Liferaft (Inflated)

007001

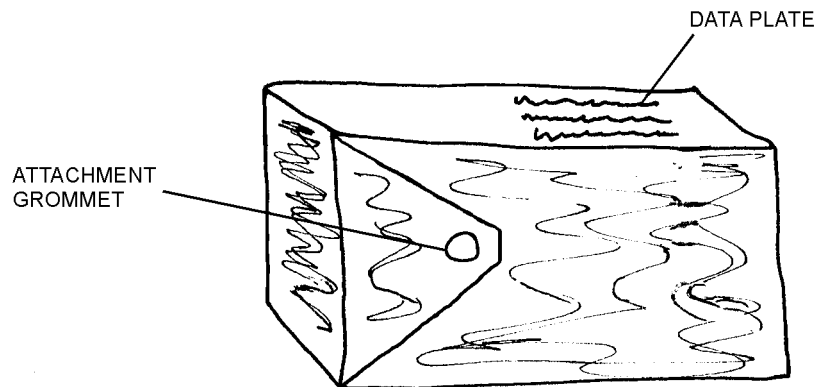


Figure 7-2. LRU-29/P22P-20 Liferaft (Vacuum Packaged)

007002

7-11. FUNCTION.

7-12. The LRU-29/P22P-20 liferaft is deployed by the aircrew. If emergency egress from the aircraft occurs over water, aircrew should deploy the raft prior to water entry if conditions allow. The liferaft should open and inflate automatically after deployment during decent. The bridle cord is attached to

a grommet in the LRU-29/P22P-20 sealed packaging and the SRU-41/P22P-20 Survival Equipment Kit. When the bridle cord is fully extended, the vacuum sealing is torn open and a separate internal line attached to the FLU-10 inflation valve actuates the inflation process via gravity drop. If emergency egress occurs over land deployment of the liferaft is not recommended prior to landing.

Section 7-2. Modifications**7-13. GENERAL.**

7-14. There are no authorized modifications to the LRU-29/P22P-20 Liferaft Assembly at this time.

Section 7-3. Maintenance**7-15. GENERAL.**

7-16. The LRU-29/P22P-20 is an environmentally sealed liferaft. There are no repairs or fabrications authorized for the LRU-29/P22P-20 liferaft. Maintenance is limited to inspection only.

7-17. All work shall be accomplished on a smooth surface free of snags and splinters. Any puncture to the packaging will cause the liferaft to be rejected. All maintenance actions shall be recorded on appropriate maintenance records in accordance with OPNAVINST 4790.2 Series.

7-18. INSPECTION.

7-19. The LRU-29/P22P-20 liferaft assembly shall be subjected to the following inspections: Place-In-Service, Daily/Turnaround, Special 14-Day, Special 448-Day, Special 1792-Day (Repack/Overhaul), and Acceptance.

7-20. If the vacuum packaged liferaft fails any inspection criteria it shall be returned to the vendor for repair. See paragraph 7-35 for return information.

7-21. The Place-In-Service inspection shall be performed on all new assemblies, or assemblies returned from vendor repair or overhaul. The AIMD performs this inspection.

7-22. The Daily/Turnaround inspection is performed on aircraft installed assemblies, in accordance with aircraft MRC requirements.

7-23. The 14-Day Special Inspection shall be accomplished at the organizational level.

7-24. The 448-Day Special Inspection shall be accomplished at the AIMD.

7-25. The 1792-Day Special Inspection (Repack/Overhaul) will be accomplished by AIMD and the vendor designated to perform the repack/overhaul. AIMD will forward the LRU-29/P22P-20 to the designated vendor. AIMD may install a spare raft to RFI the Backpack Assembly and place the overhauled liferaft in the ALSS Pool upon its return from the vendor.

NAVAIR 13-1-6.1-1

7-26. The Acceptance Inspection shall be accomplished as directed during the aircraft inventory.

7-27. All liferafts shall be subjected to Phase/Isochronal/Special Inspections prior to placing in service or, if an aircraft inventory item, at the time of the aircraft Acceptance Inspection. Thereafter the inspection interval shall coincide with the aircraft inspection cycle in which the equipment is installed. See the applicable aircraft maintenance instruction manuals or MRCs.

7-28. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

7-29. PLACE-IN-SERVICE INSPECTION. To perform the Place-In-Service Inspection, proceed as follows:

1. The A/P22P-20 Crew Backpack Assembly is received from the manufacturer assembled and ready to be placed in the aircraft. The Place-In-Service Inspection consists of a visual inspection of the assembly and a records check to ensure all data is entered on the history records. If there are no discrepancies discovered during the visual or records inspection the A/P22P-20 can be placed in service. If discrepancies exist that require the opening of the Survival Kit, proceed to steps (2) through (4).



Do not use sharp objects in the vicinity of the vacuum-sealed LRU-29/P22P-20 life-

raft. Ensure the surface where you place the liferaft is smooth and free of splinters. Do not lift the liferaft by the grommet or tear strip as it may open the vacuum seal at the initiator cuts. Liferafts that have lost vacuum must be returned to the vendor for rework.

2. Inspect vacuum packaging for pillowing (soft package) the liferaft packaging should be in a brick form. If the liferaft is pillowed return to vendor, follow instructions in paragraph 7-35. Inspect the edges of packaging for cuts or tears that are migrating towards the sealed edges, as long as the tear or cut has not started into the package sealing it shall be considered RFI. If a cut or tear has begun to tear a sealed edge, the raft shall be returned to the vendor for repair. Follow return instructions in paragraph 7-35.

3. Inspect the liferaft bridle cord for cuts, abrasion and integrity.

4. Service Life Verification. Verify date of manufacture and date placed-in-service by checking data plate on vacuum packaging, make necessary entries on appropriate form(s) in accordance with OPNAVINST 4790.2 Series.

5. Install the liferaft into the SRU-41/P22P-20 Survival Equipment Assembly in accordance with NAVAIR 13-1-6.3-1.

7-30. 14-DAY SPECIAL INSPECTION. To perform a 14-Day Special Inspection, proceed as follows:



Do not open the assembly, break any seals, or safety ties for this inspection. This is a visual inspection only.

1. Inspect the A/P22P-20 assembly, for obvious defects, torn stitching, corrosion, stains, cuts, tears, deterioration and abrasion.

7-31. 448-DAY SPECIAL/ACCEPTANCE INSPECTION. To perform the 448-Day Special/Acceptance Inspection, proceed as follows:



Do not use sharp objects in the vicinity of the vacuum-sealed LRU-29/P22P-20 liferaft. Ensure the surface where you place the liferaft is smooth and free of splinters. Do not lift the liferaft by the grommet or tear strip as it may open the vacuum seal at the initiator cuts. Liferafts that have lost vacuum must be returned to the vendor for rework.

1. Inspect vacuum packaging for pillowing (soft package) the liferaft packaging should be in a brick form. If the liferaft is pillowed return to vendor, follow instructions in paragraph 7-35. Inspect edges of packaging for cuts or tears that are migrating towards the sealed edges, as long as the tear or cut has not started into the package sealing it shall be considered RFI. If a cut or tear has begun to tear a sealed edge, the raft shall be returned to the vendor for repair. Follow return instructions in paragraph 7-35.

2. Service Life Verification. Verify date of manufacture and date placed-in-service by checking data plate on vacuum packaging, make necessary entries on appropriate form(s) in accordance with OP-NAVINST 4790.2 Series.

3. Install the liferaft into the SRU-41/P22P-20 Survival Kit Assembly in accordance with the NAVAIR 13-1-6.3-1.

7-32. 1792-DAY SPECIAL INSPECTION (REPACK/OVERHAUL). To perform the 1792-Day Special Inspection, proceed as follows:

1. Forward the liferaft to the designated vendor, follow instructions in paragraph 7-35. Replace with new or newly overhauled liferaft following the Place-In-Service Inspection in paragraph 7-29.

7-33. CLEANING AND SERVICING

7-34. CLEANING THE LRU-29/P22P-20. To clean, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint Free, Type II	MIL-C-85043 NIIN 00-044-9281



Solvents are not to be used in cleaning the sealed LRU-29/P22P-20 liferaft. Use extreme care when cleaning around the area surrounding the initiator cuts.

1. Dab or blot excess oil, fluid or dirt off of area being cleaned. Do not rub into material.

2. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

3. Clean affected area with lint free cloth or sponge.

4. Dry with lint free cloth.

7-35. REPACK/OVERHAUL VENDOR INFORMATION.

1. The LRU-29/P22P-20 Sealed Liferaft Assembly must be returned to the designated depot overhaul factory every five years for inspection and repackaging.

2. Ensure the liferaft is properly packaged to prevent damage in shipment. Improperly packaged liferafts that are damaged in shipment may be condemned and the shipping command may be charged for the cost of a new assembly.

3. Ship via traceable means to: TBP.

4. LRU-29/P22P-20 Liferaft Assemblies returned by the vendor after overhaul shall be subjected to the inspections required in paragraph 7-18.

Section 7-4. Illustrated Parts Breakdown (IPB)

7-36. GENERAL.

7-37. This section lists and illustrates the assemblies and detail parts of the LRU-29/P22P-20 Sealed Life-Ra Assembly (figure 7-3).

7-38. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

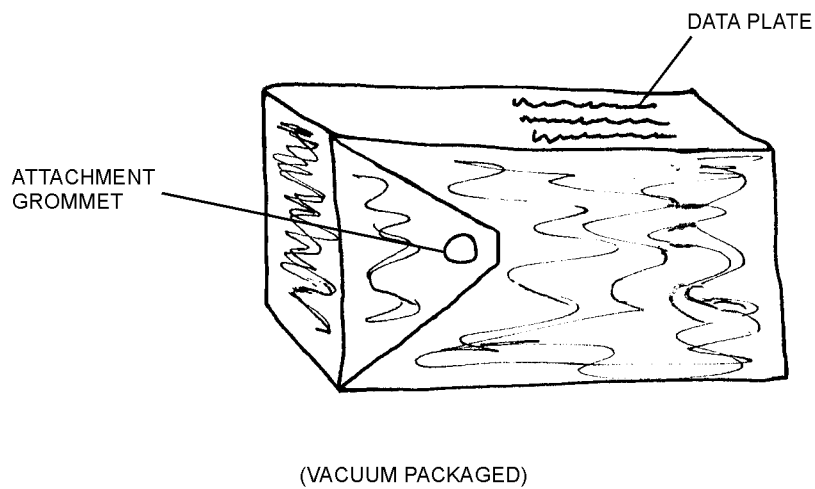
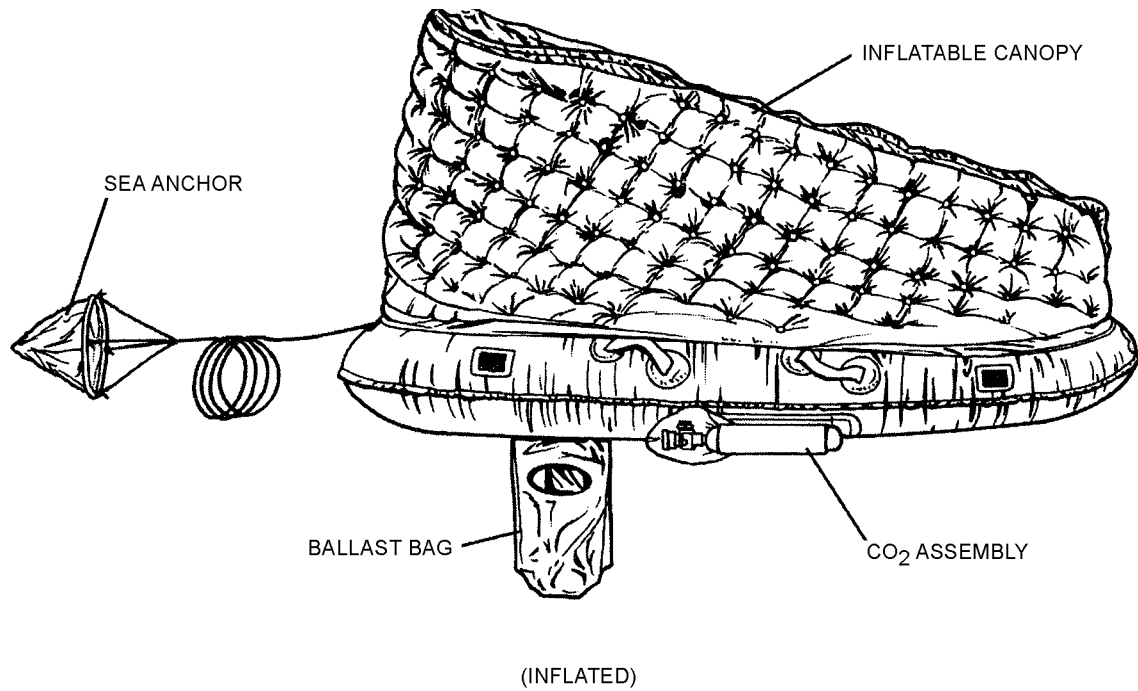


Figure 7-3. LRU-29/P22P-20 Liferaft Illustrated Parts Breakdown

007003

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
7-3	3516AS4200-1	SEALED LIFERAFT ASSEMBLY, LRU-29/P22P-20 (54786)	REF	

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code	Part Number	Figure and Index Number	SM&R Code
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3516AS4200-1 7-3 PAGDD

CHAPTER 8

LRU-12/A (MK-4) LIFERAFT ASSEMBLY

Section 8-1. Description

8-1. GENERAL.

NOTE

New procurements of four-man liferafts will be designated LRU-12/A. Reference to the designation MK-4 has been deleted throughout this chapter. However, all procedures and requirements referenced in this chapter pertaining to the LRU-12/A also still apply to MK-4 liferafts.

8-2. The LRU-12/A is a four-man inflatable liferaft intended for use by aircrewmembers forced down at sea. It is stowed in a readily accessible area inside the fuselage on all applicable aircraft.

8-3. CONFIGURATION.

8-4. The LRU-12/A liferaft assembly consists of a four-man inflatable liferaft constructed of polychloroprene-coated cloth, and an inflation assembly (CO₂ cylinder with inflation valve). Two internal vertical bulkheads divide the flotation tube into two separate compartments (bow and stern). A noninflatable floor is attached to the main tube and the bottom of the inflatable seat. An inflatable seat is manually inflated through a topping-off valve. A lifeline encircles the flotation tube. A righting line and accessory container securing line are attached to the lifeline. Survival equipment is stowed in the accessory container and in a supply pocket attached to the main tube. A sea anchor is attached to the bow and a boarding stirrup to the stern. There are two topping-off valves on the main tube, and two heaving lines, three boarding handles, and three righting handles on the underside of the floor. See figure 8-1 through 8-4.

NOTE

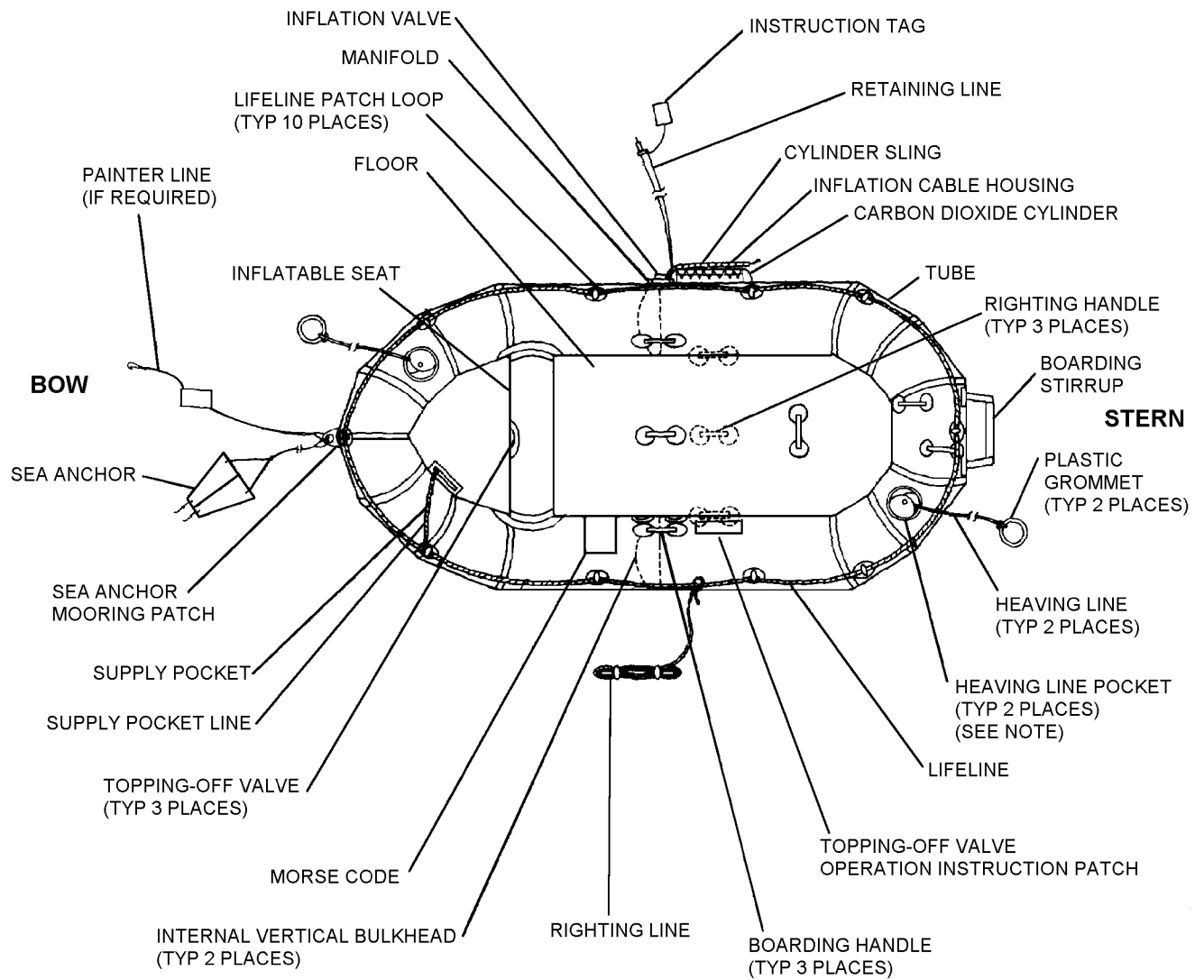
To make up the packaged assembly complete with accessories and survival items, all required components not supplied with the liferaft assembly must be individually requisitioned.

The following subassemblies have been deleted from newly procured LRU-12/A liferafts; hammock patches, starboard supply pocket, mast holder and socket, oarlock components and emergency equipment container (62A82D8-2). New liferafts shall not be reworked to add subassemblies and older liferafts shall not be reworked to remove subassemblies since their presence is not detrimental to the function of the liferaft.

8-5. APPLICATION.

8-6. Multi-place liferafts are authorized for all rotary and fixed wing transport aircraft. Selection shall be based on mission, available storage space, and total number of crew and passengers carried. Additional consideration shall be made for the liferaft inspection cycle. C-130 series (except the C-130J) wing storage is limited to the LRU-15/A in the wing installation configuration. The C-130J wing storage is limited to the LRU-33/A and the Air Cruisers 46-man P/N 63880-103/104. The V-22 is limited to the LRU-34/A and liferafts listed in the current V-22 flight clearance.

Table 8-1. Deleted



NOTE: NEWLY PROCURED LRU-12/A LIFERAFT ASSEMBLIES WILL BE CONFIGURED WITH HEAVING LINE ASSEMBLIES. EARLIER CONFIGURATIONS WITHOUT HEAVING LINES WILL BE CONSIDERED SERVICEABLE.

Figure 8-2. LRU-12/A Liferaft Assembly, Parts Nomenclature

10080002

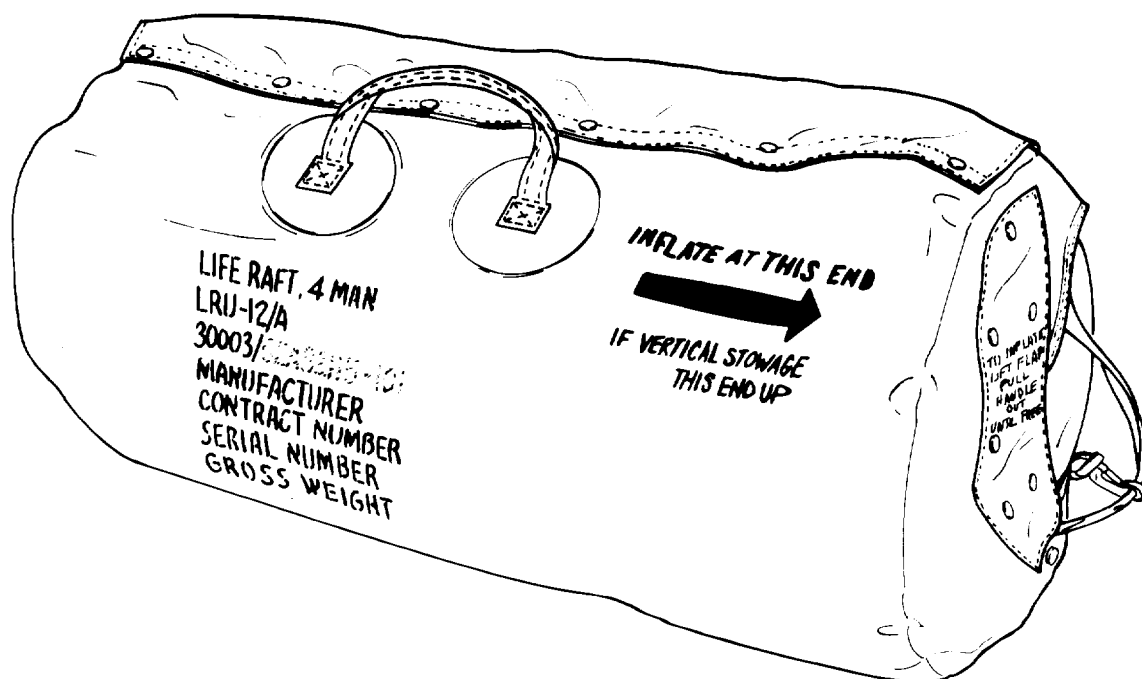


Figure 8-3. LRU-12/A Liferaft Assembly Carrying Case

10080003

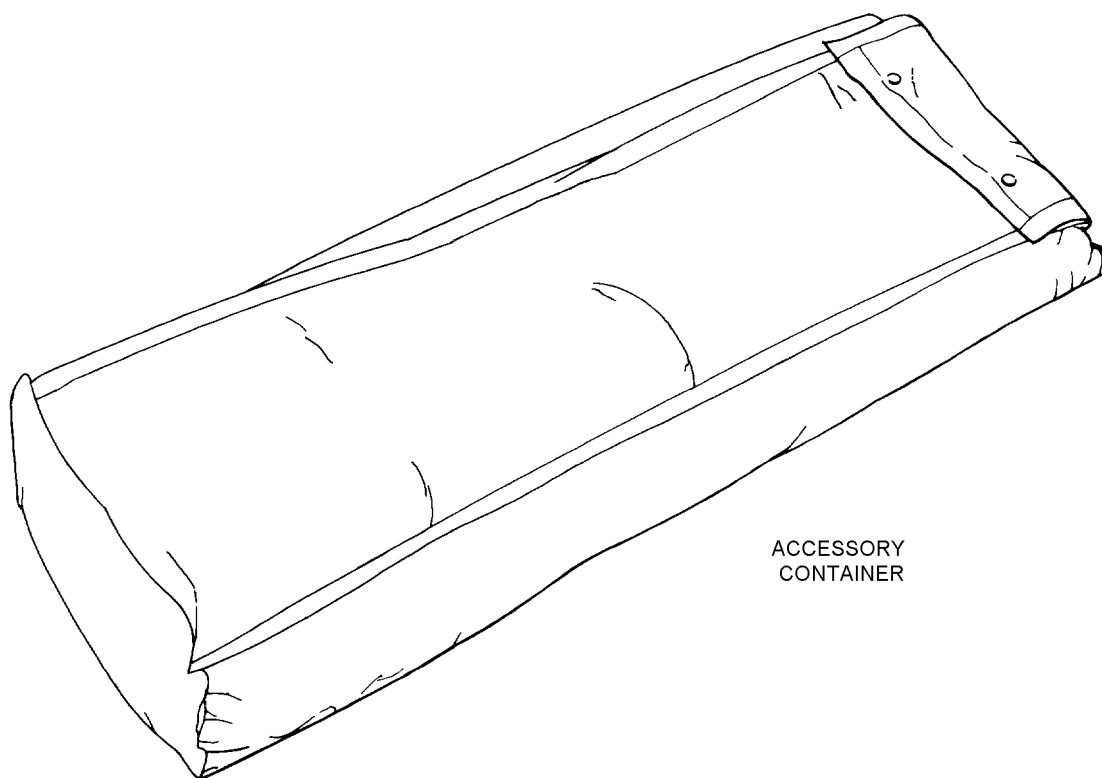


Figure 8-4. LRU-12/A Liferaft Assembly Accessory Container

10080004

Section 8-2. Modifications

8-9. GENERAL.

8-10. There are no authorized modifications for the LRU-12/A liferaft assembly at this time. Common repairs and fabrications to maintain serviceability are listed in [table 8-2](#).

Table 8-2. LRU-12/A Liferaft Common Repairs and Fabrications

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	8-50
Cementing Liferafts	8-51
Patching Liferafts	8-52
Recementing or Replace Seam Tapes	8-53
Sea Anchor/Mooring Line Replacement	8-54
Addition of International Morse Code Patch	8-56
Relocation of Multiplace Liferaft Retaining Line Instruction Tag	8-57
Fabrication of Painter Line Pouch for Multiplace Rafts	8-58
Drilling Holes in P/N A128-RT-1 Pull Cable Housing	8-59
Drilling Holes in P/N IV0303 (Vee Mfg.) Inflation Valve	8-60
Drilling Holes in P/N A128 Inflation Valve	8-61
Drilling Holes in P/N 871444 Inflation Valve	8-62
Fabrication of Cylinder Valve Antichafing Sleeve	8-63
Fabrication of 10-Foot Retaining Line	8-64
Fabrication of Boarding Handle Assembly	8-65
Fabrication of Boarding Stirrup Assembly	8-66
Fabrication of Righting Lines	8-67
Replacement of Topping-Off Valve	8-68
Repair Procedures for Carrying Case Handles	8-69
Replacement/Repair of Lifelines	8-70
Replacement of Liferaft Heaving Line	8-71
Replacement of Locking Cones (Liferaft Cases)	8-72

Section 8-3. Maintenance

8-11. GENERAL.

8-12. This section contains information on inspection, disassembly, repair/replacement, testing, and reassembly of the LRU-12A/A liferaft.

8-13. INSPECTION.

8-14. All liferaft assemblies shall be subjected to Preflight/Special and Calendar/Phase Inspections.

8-15. The Preflight Inspection shall be performed on fuselage-installed liferafts prior to first flight of the day. This inspection shall be performed by line personnel (plane captain or delegated aircrewmember) who have been designated by the line division officer, instructed and found qualified by the Aviator's Equipment Branch.

8-16. The Special Inspection shall be performed on fuselage-installed liferafts every 30 days. This inspection shall be performed at the organizational level of maintenance by personnel assigned to the Aviator's Equipment Branch. Upon completion, the date of inspection and inspector's signature shall be entered on appropriate form in accordance with OPNAVINST 4790.2 Series.

8-17. All liferafts shall be subjected to the Calendar/Phase inspection prior to placing in service or, if an aircraft inventory item, at the time of the aircraft Acceptance Inspection. Thereafter, the Calendar/Phase Inspection interval shall coincide with the aircraft inspection cycle in which they are installed, except the helicopter back pack, which shall be inspected every 225 days. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 231 days. Unless operational requirements demand otherwise, the liferaft Calendar/Phase Inspection shall be performed by intermediate level of maintenance or above.

NOTE

A functional test and pull cable proof load test shall be performed prior to placing in service or during aircraft Acceptance Inspection, and each fourth inspection cycle thereafter. A leakage test shall be performed at each inspection cycle. If inspection indicates damage beyond capability of maintenance, complete applicable forms (refer to OPNAVINST 4790.2 Series) and forward entire assembly to supply. Refer to [paragraph 8-50](#) for determination of repairability.

8-18. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

8-19. PREFLIGHT/SPECIAL INSPECTION (FUSELAGE-INSTALLED LIFERAFTS). To perform a Preflight/Special Inspection, visually inspect for the following:



Do not open liferaft access doors or any sealed or safety-wired/safety tied portion of liferaft for this inspection.

1. Fabric for cuts, tears, deterioration and abrasion.
2. Seams for proper adhesion or stitching.

3. Straps and handles for security and wear.
4. Any other parts for wear, damage and security.
5. All hardware for security of attachment, corrosion, damage, wear, and if applicable, ease of operation.
6. Liferaft retaining line for proper stowage.
7. Liferaft painter line for presence and attachment.
8. Heaving line for proper stowage (if applicable).
9. Ensure that liferaft is properly stowed. Check for bulges caused by trapped air in liferaft.
10. Ripcord pins and cable for bends, fraying, or other damage; ripcord pins for security of attachment to cable.
11. Swaged ball on handle and swaging sleeve on cable for security.

WARNING

Use only authorized safety tie. No tape, wire, or cord shall be employed to secure ripcord pins.

12. Ripcord pins fully inserted into cones, first and last ripcord pins safety-tied to cones with one turn size E nylon thread (V-T-295), single.

13. Snap fasteners on end flaps and ripcord protector flap securely fastened.

14. If discrepancies are found or suspected, Maintenance Control shall be notified.

8-20. ACCEPTANCE/CALENDAR/PHASE INSPECTION. The Acceptance/Calendar/Phase Inspection consists of the following major tasks (to be performed in the order listed):

1. Container/Case Inspection
2. Functional Test
3. Pull Cable Proof Load Test
4. Deflation
5. Visual

6. Liferaft Configuration
7. General Inspection
8. Markings Inspection
9. Survival Items and Accessories Inspection
10. Inflation Assembly Inspection
11. Inspection of Inflation Assembly (Charged)
12. Inspection of Inflation Assembly (Discharged)
13. Cylinder Markings
14. Leakage
15. Records Updating
16. Repacking

8-21. PACKED CONTAINER/CASE INSPECTION. To inspect packed containers/cases, examine the following:

1. Fabric for cuts, tears, deterioration, and abrasion.
2. Seams for proper adhesion of stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage, and security.
5. All hardware for security of attachment, corrosion, damage, wear and, if applicable, ease of operation.
6. Container and/or case for stains, dirt, and general condition.

8-22. FUNCTIONAL TEST. To functionally test a liferaft, proceed as follows:

CAUTION

Ensure that there is adequate area free of foreign objects for liferaft inflation.

1. Open liferaft case and unfold liferaft. The functional test shall be performed with the carbon dioxide bottle that was attached during the raft's last inspection. If actuation of the attached bottle will cause it to be non-RFI due to hydrostatic test requirements, and no replacement bottles are available, contact fleet support team for instructions.

2. Actuate inflation assembly.

3. Measure time of inflation; liferaft shall inflate to design shape without evidence of restriction in less than 1 minute.

4. Examine liferaft for obvious damage such as cuts, tears, ruptured seams, and damaged manifold.

5. Determine cause if liferaft does not properly inflate. Remove CO₂ bottle and inflation assembly, and inspect inlet valve for cleanliness and embedded foreign matter.

6. If correction is made, repeat [steps 2 through 4](#).

7. Deflate liferaft in accordance with [paragraph 8-24](#). Ensure that all carbon dioxide has been removed.

8-23. PULL CABLE PROOF LOAD TEST. To perform the proof load test, proceed as follows:

NOTE

Perform the Proof Load Test only after the functional test and prior to placing an inflation assembly in service.

1. Remove inflation valve cover plate.
2. Remove pull cable from valve and apply a 50-pound pull force between cable ball and snaphook.
3. Examine pull cable for broken strands of wire, deformed snaphook, security of snaphook spring latch attachment, and loose or cracked swage fittings. If any damage is found, the pull cable shall be discarded and replaced with a new cable. The new cable shall also be tested in accordance with [step 2](#). If snaphook spring latch is loose, it may be repaired in accordance with instructions contained in modification section for the liferaft, or replaced at the discretion of the inspection activity.
4. If pull cable passes this test, reinstall in accordance with [paragraph 8-46](#).

8-8 Change 1

8-24. DEFLATION. To deflate liferaft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Vacuum Unit	61E44688 (CAGE 80049)
As Required	Hose, Rubber, 3/8 or 1/2 inch Inside Diameter	—

1. Attach one end of rubber hose to vacuum pump.
2. Deflate through topping-off valve. Open valve and hold vacuum pump hose over opening in valve. When compartment is collapsed, screw valve closed.

8-25. VISUAL INSPECTION. Prior to visually inspecting a liferaft assembly, the liferaft shall be inflated with air to 1.0 psig.



Remove CO₂ cylinder prior to inflating liferaft with air.

1. Remove CO₂ cylinder from CO₂ cylinder sling.



Ensure that diffuser plug is installed in CO₂ cylinder.

NOTE

If a suitable air source is not available, water pumped nitrogen (BB-N-411) may be substituted.


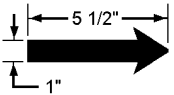
2. Inflate liferaft with air to 1.0 psig.

8-26. LIFERAFT CONFIGURATION. The liferaft shall be updated by comparing it to the configuration illustrations in [Figures 8-1 through 8-4](#) and [Figure 8-21](#).

Table 8-3. LRU-12/A Liferaft Markings

Marking	Location	Letter Height
LIFERAFT, INFLATABLE 4-MAN TYPE LRU-12/A USN 30003/62A82H1- [applicable dash number] MANUFACTURER'S IDENTIFICATION CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Tube, starboard side of bow, outboard	1/2 inch
KEEP ACCESSORIES TIED TO RAFT TO AVOID LOSS IN CASE OF CAPSIZING	Tube, port side of bow, inboard	5/8 inch
INFLATION VALVE OPERATION TO INCREASE TUBE PRESSURE 1. SCREW HAND PUMP INTO VALVE CAP 2. ROTATE VALVE CAP 1 1/2 TURNS TO RIGHT 3. PUMP TO INFLATE TO DESIRED PRESSURE 4. ROTATE VALVE CAP 1 1/2 TURNS TO LEFT AND REMOVE PUMP TO DECREASE PRESSURE 1. ROTATE VALVE 1 1/2 TURNS TO THE RIGHT AND BLEED	Under or along side of the topping-off valves on the port liferaft tube inboard and seat tube	3/8 inch 1/4 inch 3/16 inch 1/4 inch 3/16 inch
INTERNATIONAL MORSE CODE [see figure 8-11]	Inboard, port side, aft of seat	1/4 inch
BEFORE INFLATION CLIP SNAPHOOK TO LIFE VEST	On tag attached to webbing retaining line	3/8 inch
TUBE SECTION NUMBERS	Each tube section	1/2 inch
SUPPLIES KNIFE, COMPASS, STEADY BURNING LIGHT, WHISTLE, FLARE GUN, CODE CARD, NYLON CORD, STROBE LIGHT, RADIO	Supply pocket, port side	1/2 inch 1/4 inch
SEA ANCHOR MIL-A-3339C Type I Size 1 MANUFACTURER CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year]	Inside sea anchor	1/4 inch
HEAVING LINE	Stenciled on tube, inboard below assembly	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.		

Table 8-4. LRU-12/A Case and Container Markings

Case/Container	Marking	Location	Letter Height
Carrying Case	LIFERAFT, INFLATABLE, 4 MAN LRU-12/A 30003/62A82H5-101 MANUFACTURERS IDENTIFI- CATION CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable numbers]	Side panel	1 inch
	INFLATE AT THIS END 	Both sides of case at pull handle end	1 inch 
	IF VERTICAL STOWAGE THIS END UP	Both sides of case below arrow	1 inch
	INFLATE OTHER END	End panel opposite pull handle end	1 inch
	TO INFLATE, LIFT FLAP, PULL HANDLE OUT UNTIL FREE	Pull handle flap	1/2 inch
Accessory Container	Each accessory container shall be marked with the name of the equipment stored in the container. Refer to table 8-5 .	Front panel	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.			

8-27. GENERAL INSPECTION. To perform the general inspection, inspect the following:

NOTE

If color, location, or stitching patterns of repaired, replaced, or previously incorporated noncritical items or features (eg, life-raft pockets, handle, ballast bag, sea anchor, etc.) do not exactly conform to instructions, do not remove or rework item or feature if flotation stability or capability and security of attachment are not compromised.

1. Liferaft fabric for cuts, tears, punctures, deterioration and abrasion.
2. Seam tapes for proper adhesion.
3. Seam tapes joining tubes to floors, other tubes or canopy for adhesion and wear.
4. Liferaft floor and canopy for cuts, tears, punctures, and abrasions.
5. All patches for proper adhesion.
6. Pockets for tears, abrasions, and security of attachment.
7. Handles for wear, deterioration, and security of attachment.
8. Sea anchor for wear, tears, and security of attachment.
9. Oral inflation tube, as applicable, for deterioration.
10. Damaged or deteriorated topping-off valves, if applicable, and security of retaining screw.
11. All hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.
12. Liferaft for stains, dirt, and general cleanliness.
13. Any other parts for wear and damage.

8-28. MARKINGS INSPECTION. Compare markings on liferaft and case and/or container to markings shown in [tables 8-3 and 8-4](#). Restore faded markings. Install/replace International Morse Code patch as needed: refer to [paragraph 8-56](#). Correct any markings which do not agree with the applicable table. To change markings, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Marking, Laundry, Black	SPE-92 (NIIN 00-161-4229)
	-or-	
	Ink, Drawing, Waterproof, Yellow	A-A-59291 (NIIN 00-634-6583)

1. Paint over incorrect marking using waterproof ink (yellow or black as applicable).

2. Add correct marking as close as possible to specified location using waterproof ink.

8-29. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

NAVAIR 13-1-6.5 contains information inspection/replacement and modification of the survival items.

With the exception of batteries, items reaching overage while packed in survival kits and rafts shall remain in service until the next inspection cycle of the completed assembly.

1. Inventory all accessories and survival items by checking items against applicable table. Replace missing or unsatisfactory items. [Table 8-5](#) lists accessories and survival items used.

NOTE

Ensure URT-33 battery service life does not expire prior to the next scheduled calendar inspection. Refer to NAVAIR 16-30URT33-1 for battery service life. Batteries which exceed service life requirements must be discarded regardless of their condition.

2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

Table 8-5. LRU-12/A Survival Items

Description	Quantity Required	Reference Number	NIIN	SM&R Code
<u>Packed In Accessory Container</u>				
Desalter Kit, Sea Water, MK2, Type II (Note 10)	2	MIL-D-5531E	00-372-0592	PAOZZ
Sea Dye Marker	3	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal, MK-124 MOD 0	4	—	01-030-8330	—
Water Storage Bag (Size A)	2	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Note 12)		—	01-124-4543	PAOZZ
w/ MROD	4			
w/o MROD	10			
First Aid Kit, Size A	1	SC-C-6545-IL Vol. #2	00-922-1200	—
Desalinator, Manual Reverse Osmosis (Notes 1 and 12)	1	—	00-313-6086	—
Sunburn Preventative Preparation	1	MIL-S-37800	01-121-2336	PAOZZ
Food Packet, Liferaft	4	MIL-F-15381	01-028-9406	PAOZZ
Bailing Sponge	1	L-S-626	00-240-2555	PAOZZ
Hand Pump	1	MIL-P-8258	00-097-4580	PAOZZ
Combat Casualty Blanket Type I	1	MIL-B-36964	00-935-6665	PA--Z
Hand Generated Flashlight A-9 (Note 2)	1	MIL-F-8209	00-283-9806	PAOZZ
<u>Packed In Supply Pocket</u>				
Flare Gun, MK-79 MOD 0	1	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or Signal Light (Strobe) SDU-39/N	1	MIL-L-38217	00-067-5209 01-411-8535	PAOZZ
Light, ChemiLuminescent (Note 11)	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Note 3) or Signal Mirror, Type II	1	MIL-M-18371 MIL-M-18371	00-105-1252 01-455-6695 01-455-6671	PAOZZ PAOZZ PAOZZ
Survival Radio (Notes 4 and 8) and/or Radio Beacon AN/URT-33A (Note 8)	As Required As Required	— MIL-B-38401	— 00-160-2136	— PAOGG
Code Card (Note 5)	1	—	—	—
Whistle, Type II	1	MIL-W-1053	00-254-8803	PAOZZ

Table 8-5. LRU-12/A Survival Items (Cont)

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Compass, Pocket, Type MC-1 (Note 9) or Compass, Wrist	1	MIL-C-17850 WCC-100	00-515-5637 00-809-5252	PAOZZ PAOZZ
Pocket Knife	1	MIL-K-818C	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	MIL-C-5040	00-240-2154	PAOZZ
<p>Notes: 1. MROD shall be used in RF assets (See Note 2).</p> <p>2. Required for Arctic missions; optional otherwise.</p> <p>3. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted.</p> <p>4. Ensure battery service life does not expire prior to next scheduled special inspection. Refer to the applicable manual for the installed radio for battery service life.</p> <p>5. Refer to NAVAIR 13-1-6.5.</p> <p>6. Deleted.</p> <p>7. Deleted.</p> <p>8. Survival radio or radio beacon requirements shall be in accordance with OPNAVINST 3710.7 series. Following radios apply: Voice-Beacon: AN/PRC-90, AN/PRC-90-2, and AN/PRC-149. Beacon Only: AN/URT-33, AN/PRT-5, and AN/PRC-140. The AN/PRC-149 will become the preferred radio when available.</p> <p>9. Use MIL-C-17850 until stock is depleted then use WCC-100.</p> <p>10. Authorized for use in Arctic/Antarctic environments.</p> <p>11. Chemical Lights will replace SDU-30. If chemical lights are not available SDU-30 may be used until next repack.</p> <p>12. MROD should not be used where water temperatures are below 36°F.</p>				

3. Operate all items which are not expended in use. Replace as necessary.

8-30. INFLATION ASSEMBLY INSPECTION. Inspect the inflation assembly as follows:

8-31. Inspection of Inflation Assembly (Charged). To inspect a charged inflation assembly, proceed as follows:

WARNING

Gas under pressure. Do not attempt to remove valve from cylinder.

1. Inspect cylinder markings. Re-mark as required in accordance with paragraph 8-33.

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damage or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced perform pull cable proof load test in accordance with paragraph 8-23.

3. Weight inflation assembly. If weight indicated on scale is not the same as the gross weight printed on the cylinder (P/N MS26545B2C0147 or P/N MS26545B4C0147) with tolerance specified, or if no gross weight is printed on the cylinder, discharge the cylinder and recharge it to 3.21 to 3.29 lbs in accordance with paragraph 8-45.

WARNING

Inspect safety wire to ensure that wire size and type are as specified in [paragraph 8-46](#).

4. If necessary, safety-wire the assembly in accordance with [paragraph 8-46](#).

8-32. Inspection Of Inflation Assembly (Discharged). To inspect a discharged inflation assembly, proceed as follows:

1. Inspect cylinder markings. Re-mark as required in accordance with [paragraph 8-33](#).

2. Check date of last hydrostatic test. If greater than 5 years see [paragraph 8-42](#) for disposition.

3. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damaged or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced, perform pull cable proof load test in accordance with [paragraph 8-23](#).

4. Recharge assembly in accordance with [paragraph 8-45](#).

8-33. Cylinder Markings. Markings on all CO₂ inflation cylinders shall be in black letters 1/4-inch high. Information shall include gross weight, tare weight, and weight of CO₂. In addition, multiplace liferaft cylinders shall be marked with the following information in 1-inch red letters: WARNING - COMPRESSED GAS - DO NOT DROP. Paint and stencil cylinder as required. Weight of CO₂ is 3.21 to 3.29 lbs. Ensure that all markings are included as necessary.

8-34. LEAKAGE TEST. To perform a leakage test, proceed as follows:

CAUTION

Liferaft should not be disturbed during leakage test.

8-35. Test Fixtures. As assembled, test fixtures are not stocked in the Supply System; fixtures must be fabricated to meet the requirements of the schematic shown in [figure 8-5](#). A suggested test fixture consisting of a three, way valve, pressure gage, and suitable adapters for the compartments being tested is shown in [Chapter 3](#).

8-36. Test Procedure. To test liferafts for leakage using test fixture shown in [Chapter 3](#), proceed as follows:

CAUTION

Ensure that area surrounding liferaft is clear of foreign objects.

If three-way valve is not used, measuring device valve must be closed when air-feed valves are open.

1. Open topping-off valve then thread adapter into topping-off valve threads. Open air supply valve and inflate liferaft. Alternately position valve at measuring device, vent and air supply until proper pressure is attained. Refer to [table 8-6](#).

2. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure shall be readjusted, if necessary, to the leakage test pressure. Refer to [table 8-6](#). Record time.

3. Disconnect air supply and check test fixture for leaks. Ensure that all valves are closed.

4. Record temperature and barometric pressure and allow raft to remain undisturbed for a minimum of 4 hours.

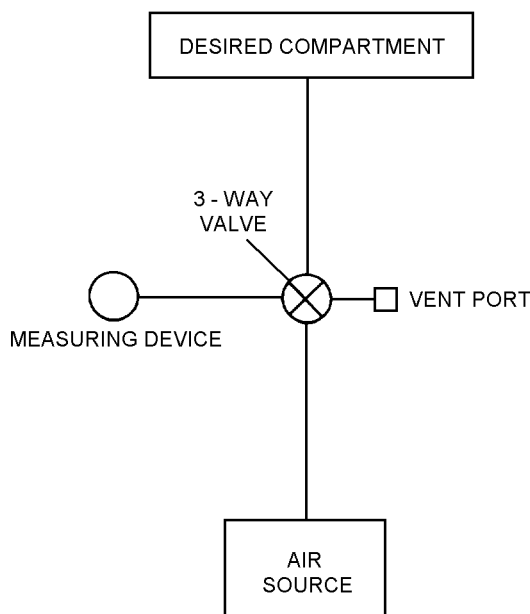


Figure 8-5. Test Fixture Schematic

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Table 8-6. LRU-12/A Test Pressures

Compartments	Leakage Test Pressure (psig)	Minimum Pressure (psig)
Bow Section	2.0	1.60
*Inflatable Seat	1.0	0.60
*Stern Section	2.0	1.60
*Compartments may be tested simultaneously.		

NOTE

If the raft has been stacked during the 4-hour inspection period remove from stacking and place in a horizontal position on the floor or table in the inspection area and take test pressure reading. In no event shall the pressure in the raft be determined with another raft stacked upon it.

5. At the end of a minimum of 4 hours after the readjustment period in [step 2](#) record test pressure.

NOTE

Steps 6 through 13 shall be performed only after leakage test readings have been recorded.

6. Record temperature and barometric pressure and correct test pressure for any changes in temperature and barometric pressure. Refer to [tables 8-7](#) and [8-8](#).

EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	- 5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057

UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

Step 6 - Para 8-36

H0036006

Table 8-7. Temperature Conversion Chart

Temperature Differences (Degrees F)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.248
9	0.279
10	0.310
Rise in temperature: subtract from gage reading. Fall in temperature: add to gage reading.	

7. If pressure of compartment is below pressure limits in [table 8-6](#), inflate to leakage test pressure and check for leaks, using a soap solution. Mark leaks, rinse with fresh water, and dry with a lint free cloth. Determine repairability in accordance with [paragraph 8-50](#).

8. Apply a small amount of soap solution to manifold, and inspect for leaks. Inspect for damage, excessive wear and corrosion.

9. Apply a small amount of soap solution around topping-off valve and check for leaks.

10. Deflate liferaft in accordance with [paragraph 8-24](#).

11. Attach retaining line to neck of cylinder with a lark's head knot.

12. Install cylinder valve anti-chafing sleeve.

13. Reinstall properly charged inflation assembly.

Table 8-8. Barometric Pressure Conversion Chart

Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368
Rise in pressure: add to gage reading. Fall in pressure: subtract from gage reading.									

14. Tighten coupling nut to raft inlet manifold to a torque value of 140 to 150 in-lb.

15. Lace cylinder sling closed and snap cover over lacing where applicable.

8-37. RECORDS UPDATING. Make necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

8-38. CLEANING AND SERVICING.

8-39. Cleaning and servicing consists of cleaning the liferaft and containers and/or cases, checking hydrostatic test date on multiplace liferaft CO₂ cylinders, inspection/replacement of poppet assembly, replacing the safety disc and washer on inflation valves, recharging CO₂ cylinders and safety-wiring inflation valves.

8-40. CLEANING OF LIFERAFTS. To clean liferafts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	As Required
As Required	Cloth, Lint-Free, Type II	MIL-C-85043 NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589

CAUTION

Solvents are not to be used in the cleaning of liferafts.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

2. Apply cleaning solution to soiled area with a spray or sponge.

3. Allow solution to remain on the surface for several minutes, then agitate with a soft brush or rag.

4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.

5. Dry liferaft with a lint-free cloth and apply a light coating of talc.

8-41. CLEANING OF CONTAINERS AND/OR CASES. Clean in accordance with [paragraph 8-40](#).

8-42. HYDROSTATIC TEST. Inspect CO₂ cylinders used on multiplace liferafts to determine if the previous hydrostatic test was within the last five years. However, a fully charged cylinder (charged to the cylinder gross weight) is considered serviceable, regardless of the last hydrostatic test date, until discharged. If over five year due date for testing, and cylinder has been discharged, proceed with hydrostatic test:

WARNING

Bottles should be turned in for testing as close to due date as possible. Extending hydrostatic testing by leaving bottle charged may result in corrosion build up on inside of cylinder, which may cause a malfunction during actuation.

Wire-wrapped cylinders must have wire-wrapping removed prior to hydrostatic testing; cylinders passing the hydrostatic test must be rewound prior to placing back in service.

Wire-wrapped cylinders must have letter W at end of part number. Cylinders received without the W at end of part number do not require wire-wrapping.

Materials Required

Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
-or-		
1	Parts Kit, Valve	ASV710 (CAGE 34009) NIIN 00-999-7662

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man liferafts, have siphon tubes installed.

1. Disconnect the cylinder and valve assembly from the raft. Remove and retain valve for the replacement cylinder.

2. Mark appropriate form "Hydrostatic Test Required" in accordance with OPNAVINST 4790.2 Series and return old cylinder to Supply.

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man liferafts, have siphon tubes installed.

3. Obtain a replacement cylinder. Before installing valve on cylinder, gently tap inverted cylinder with a small piece of wood. If any rust or other contamination falls from cylinder, do not use that cylinder; draw another cylinder and repeat contamination check.

4. Check for installation of siphon tube.

5. Replace stem in inflation assembly valve if necessary.

6. Install a new sealing washer.

7. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.

8. Charge cylinder and reconnect valve and cylinder to liferaft as appropriate.

8-43. INSPECTION/REPLACEMENT OF INFLATION VALVE POPPET ASSEMBLY. If leakage of CO₂ is from valve discharge port, inspect the valve poppet (P/N ASV-601, NSN 4220-00-507-6667) for worn seat as follows:

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve from a charged CO₂ assembly.

Materials Required

Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
-or-		
1	Parts Kit, Valve	ASV 710 (CAGE 34009) NIIN 00-999-7662
1	Valve, Poppet Assembly	P/N ASV-601 NSN 4220-00-507-6667

1. Remove cylinder from liferaft.
2. Remove valve from cylinder.
3. Disassemble valve (Figure 8-6) and inspect poppet for worn seat. Replace poppet assembly if necessary.
4. Install a new sealing washer.
5. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.

8-44. REPLACEMENT OF SAFETY DISC AND WASHER ON INFLATION VALVES. (See figure 8-7.) To replace safety disc and washer on inflation valve A-128/871444, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Repair Kit (Insert, Washer, Disc)	903684 (CAGE 33525) NIIN 00-703-7811
1	Wrench, Torque	—
1	Socket, 5/16 inch	—
1	Hex Stock, 5/16 x 2 inch Length	—

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve or valve safety disc plug from a charged CO₂ assembly.

1. Remove cylinder from liferaft.
2. Remove safety disc plug; insert safety disc and washer.
3. Place new washer into inflation valve safety disc orifice.
4. Place new safety disc into inflation valve safety disc orifice.
5. Replace insert and safety disc plug.

NOTE

While tightening the safety disc plug, align insert with plug.

6. Tighten safety plug on A-128/871444 to 29 ft-lb of torque.

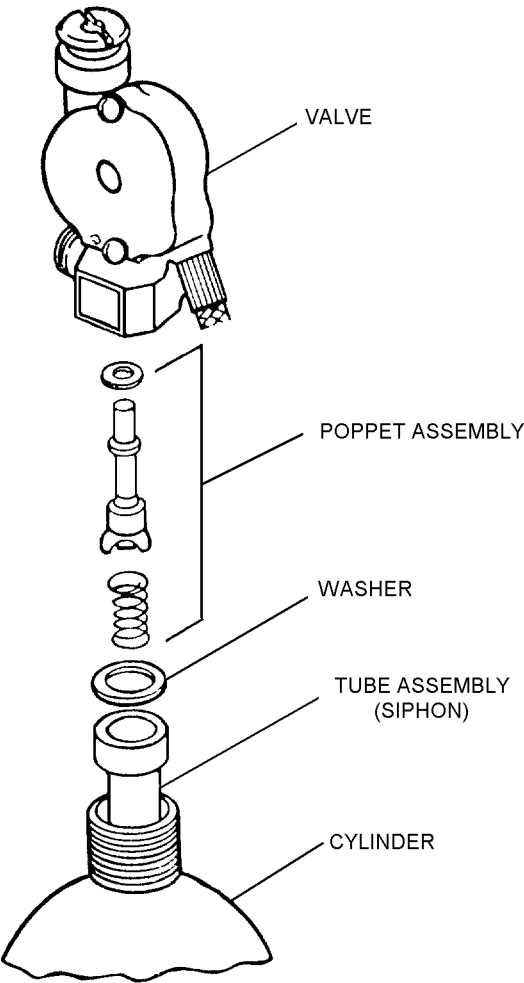


Figure 8-6. Valve Poppet Disassembly

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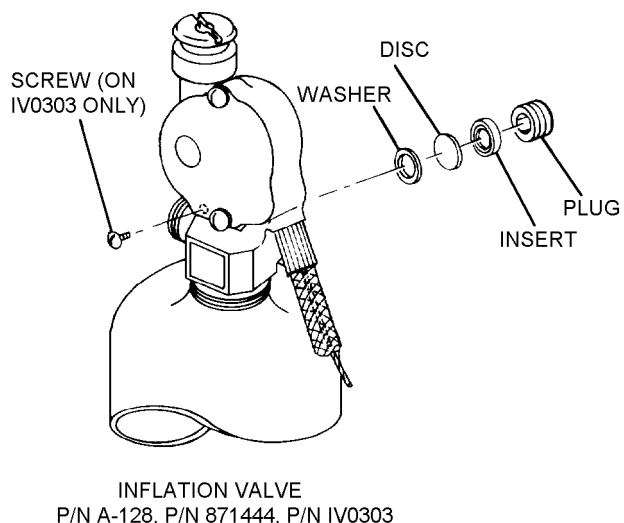


Figure 8-7. Disassembly of Inflation Valve Safety Disc Assembly

8-45. RECHARGING. To recharge the inflation assembly, proceed as follows (see [figure 8-8](#)):

WARNING

When discharging partially charged or overcharged CO₂ cylinders, hold firmly in place with a suitable holding device (vice). Protect CO₂ cylinder from vice jaws with cloth or a suitable substitute. Position cylinders so escaping gas is not directed toward any personnel.

NOTE

Inspect CO₂ cylinders for multiplace life-rafts before recharging. Refer to [paragraph 8-32](#).

Charged inflation assemblies used as spare replacements shall be inspected in accordance with [paragraph 8-31](#) prior to raft installation.

To perform the following filling procedures it is necessary to ensure that CO₂ cylinder is completely discharged.

1. Remove inflation valve cover and rotate cam with screwdriver to open position.

2. Weigh and record tare weight (empty weight cylinder, valve and cable assembly) of inflation assembly. Correct tare weight marking on cylinder if necessary.

NOTE

Supply cylinders not equipped with siphon tube must be inverted during transfer operation. Inverting cylinder allows the liquid to flow from the valve. Supply cylinders with siphon tube (straight pipe) extending from the valve to the bottom of the cylinder can be emptied in the vertical position.

3. Install proper charging adapter on inflation assembly.

4. Secure inflation assembly to weighing pan.

5. Open supply cylinder valve, fill line valve and relief valve to purge fill line. Close fill line valve and relief valve.

NOTE

Ensure fill line is free from contact with any object along entire distance from compressor to charging adapter. If fill line does not hang free, accurate weight readings cannot be obtained.

6. Connect fill line to inflation assembly and zero scale.

NOTE

Proper charge weight is 3.21 to 3.29 lbs.

7. Ensure inflation assembly valve is open.

8. Open fill line valve.

9. Allow carbon dioxide to cascade from supply cylinder into inflation assembly. If gross weight (tare weight plus 3.21 to 3.29 lbs) cannot be reached, start compressor and complete charging. Stop compressor upon reaching proper gross weight.

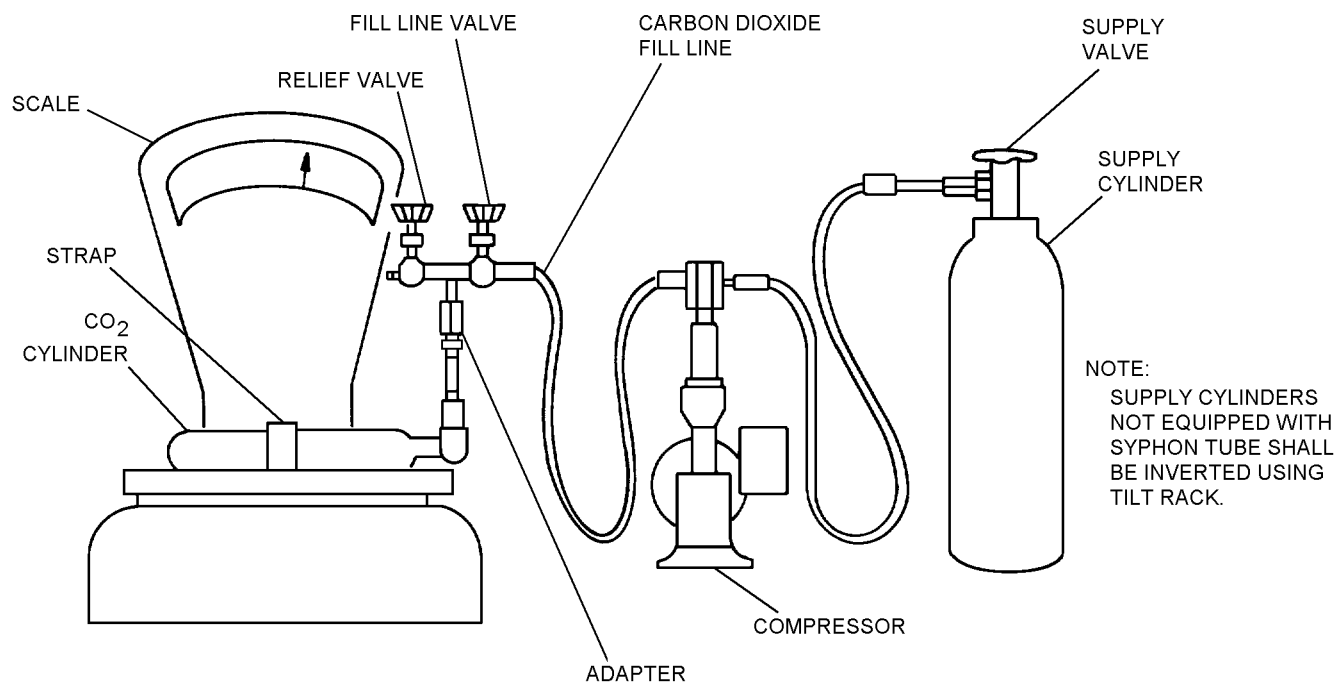


Figure 8-8. Recharging Schematic

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10. Close fill line valve.

11. Close inflation assembly valve. Open relief valve on fill line valve if applicable.

12. Disconnect fill line from inflation assembly. Remove charging adapter.

13. Measure gross weight of charged inflation assembly.

14. If gross weight of inflation assembly is greater than required, carefully bleed off excess from inflation assembly. If gross weight is less than required, reinstall charging adapter and repeat [steps 5 through 14](#).

15. Reinstall diffuser plug, if applicable.

NOTE

When other cylinders are to be recharged immediately, leave supply cylinder valve open.

16. Close supply and bleed system pressure.

NOTE

Remove cover plate on multiplace liferaft valve assemblies.

17. Immerse inflation assembly in water tank.

CAUTION

If inflation valve leaks from discharge port, inspect inflation valve poppet assembly in accordance with [paragraph 8-43](#).

18. Check for leaks; then remove assembly from tank and dry with an air blast. Wipe assembly with a lint-free cloth.

NOTE

After storage period, inflation assembly should be checked for proper weight.

19. If required, re-mark tare weight, gross weight, charge weight on cylinder.

20. Safety-wire the assembly in accordance with [paragraph 8-46](#).

8-46. SAFETY-WIRING. To safety-wire the inflation assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Torque Meter	—
1	Special Socket	—
1	Dial Push/Pull Gage	DPPH50 (CAGE 11710) or equivalent NIIN 00-473-0108

WARNING

To ensure that proper safety wire is used on liferaft inflation assemblies, a tensile strength test shall be performed on a sample of wire from each spool intended for this use prior to using.

Materials Required

Quantity	Description	Reference Number
As Required	Wire, Aluminum, 0.032 inch Diameter, Temper 0	QQ-A-225/1 NIIN 00-595-8200
2	Screw, Brass	MS35273-2 NIIN 00-720-8657
2	Washer, Lock	MS35333-10 NIIN 00-011-5551
As Required	Seal, Lead	NIIN 00-598-3427
1	Pin, Steel	—

1. Secure one end of a 12-inch sample of aluminum wire (0.032-inch diameter) to a stationary support.

2. Attach opposite end to pull scale; then apply a pull force.

NOTE

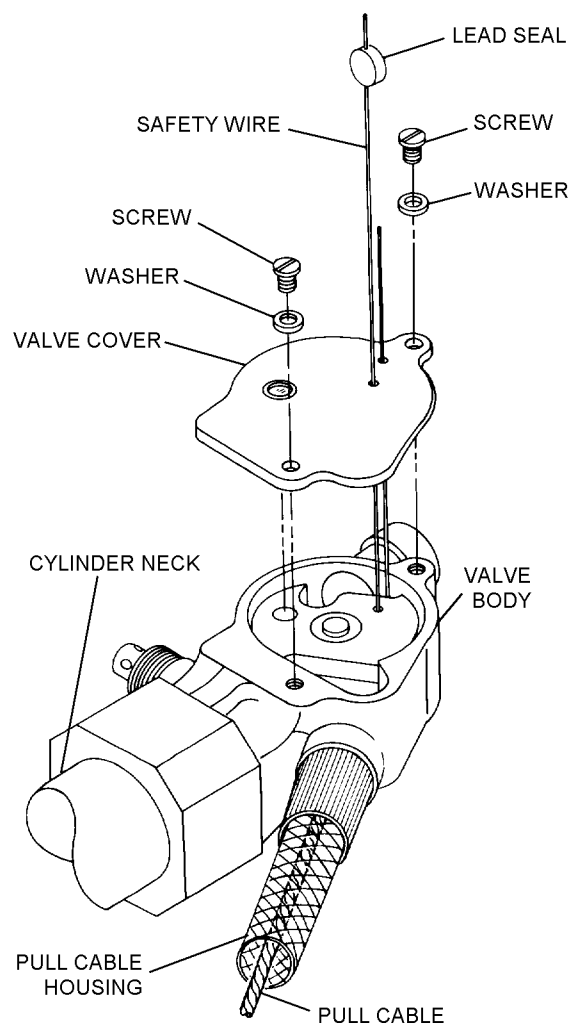
Tensile strength of sample shall be 8 to 15 pounds.

3. Remove valve cover plate and ensure correct routing of pull cable. See figure 8-9.

NOTE

Ensure that pull cable has been proof load tested in accordance with [paragraph 8-23](#).

4. Route safety wire as shown. Use 0.032-inch diameter aluminum wire.



TYPICAL INSTALLATION OF SAFETY WIRE

H0046004

Step 4 - Para 8-46

5. Replace valve cover. Twist ends of safety wire to achieve maximum tautness and crimp lead seal. Ensure that pull cable is properly installed. Green dot should be visible in valve cover window.

6. Examine inflation valve to ensure the presence of screw and lockwasher.

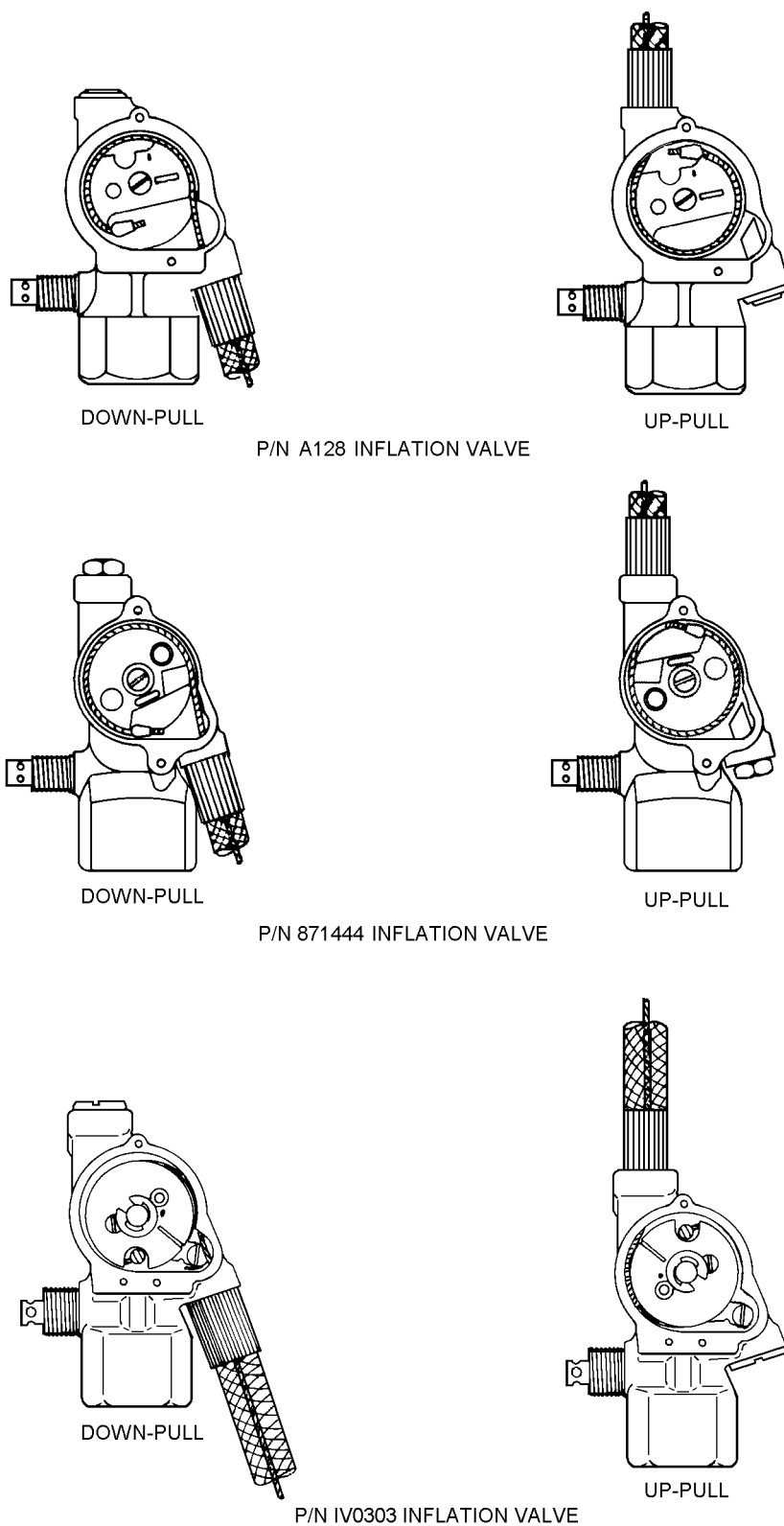
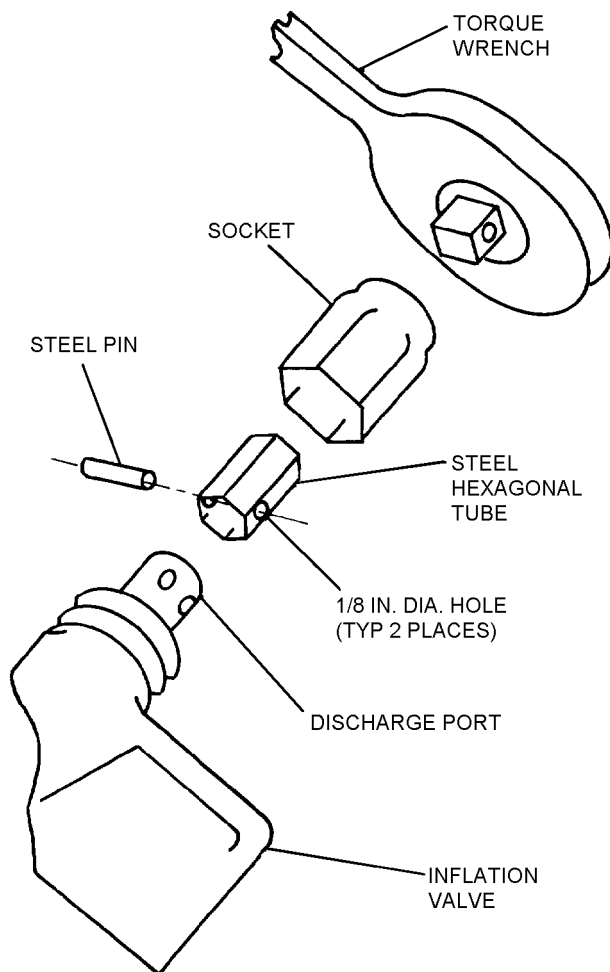


Figure 8-9. Routing of Multiplace Liferaft Pull Cable

10080009

7. Tighten discharge port to a torque valve of 60 ±5 in-lb.



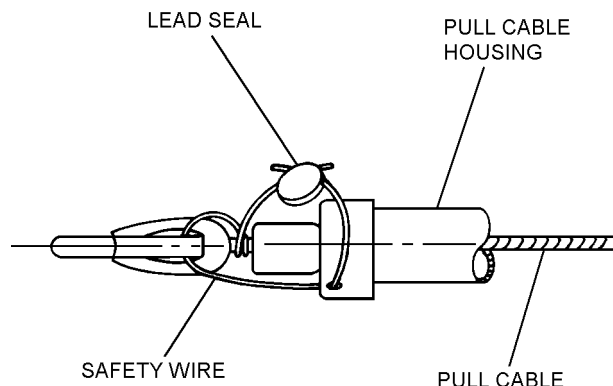
H0046007

Step 7 - Para 8-46

NOTE

Multiplace liferafts used in aircraft wing compartments shall be safety-wired according to applicable aircraft maintenance instructions.

8. Safety-wire pull cable to pull cable housing as shown. Use 0.032-inch diameter aluminum wire.



TYPICAL REMOTE PULL CABLE SAFETY WIRING

H0046008

Step 8 - Para 8-46

9. If inflation assembly is to be stored, attach a red tag with the following instructions printed in ink: **WARNING: WEIGH INFLATION ASSEMBLY BEFORE INSTALLING ON LIFERAFT. DO NOT INSTALL IMPROPERLY CHARGED CYLINDER OR IMPROPERLY SAFETY-WIRED INFLATION VALVE.**

8-47. REPAIR/REPLACEMENT.

8-48. This section contains instructions for the repair or replacement of various components or subassemblies of the LRU-12/A liferaft to ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for minor parts which are defective, corroded or worn and require replacement are included in the applicable paragraph of this section. Otherwise, refer to [Section 8-4](#). All repairs shall be documented by making necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

8-49. Replacement of easily removed assembly components such as CO₂ inflation valves are authorized in addition to repair and replacement procedures documented in this section. The liferaft shall be subjected to a functional and leakage test each time CO₂ inflation valves are removed and replaced for any reason, and each time inflation valve gaskets are replaced.

8-50. DETERMINATION OF REPAIRABILITY.

Liferafts shall be considered beyond repair for any of the following reasons:

- 1. Porous fabric areas on tubes.
- 2. Split or open tube seams.
- 3. Leakage test failure resulting from other than cut, tear, or puncture.
- 4. Damaged, malfunctioning, excessively worn, or corroded inlet valve, manifold assembly or oral inflation tube, as applicable.
- 5. Damaged, malfunctioning, or excessively corroded topping-off valve that cannot be corrected by replacement of topping-off valve opening insert and washer.
- 6. Leaky bulkheads.
- 7. Extensively damaged floor.
- 8. Holes or abrasions exceeding 2 inches in length or diameter in pneumatic compartment.
- 9. Deterioration of the rubberized fabric caused by oil, grease, or any other foreign substance.
- 10. Deterioration of the rubberized fabric caused by a heavy mildewed condition.
- 11. Opening of air retaining seams for internal repair.
- 12. Rips, tears, or punctures in the pneumatic compartments which exceed 2 inches.
- 13. In the judgement of a competent inspector, requiring excessive repair.

8-51. CEMENTING LIFERAFTS. All cementing of liferafts shall be performed as follows:

Support Equipment Required		
Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620 NIIN 00-243-9401

Materials Required

Quantity	Description	Reference Number
1	Disposable Brush	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
-or-		
As Required	Methyl Ethyl Ketone, (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Do not use toluene or MEK near open flames, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-12/A life-raft.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Toluene or MEK must be applied vigorously to liferaft material over three years old in order to reactivate the material prior to cementing. Pigment from the material coloring staining a cloth rubbed over the treated surface will indicate the material has been reactivated. Adhesive shall be applied immediately after the surface has dried.

1. Clean both surfaces to be cemented with four applications of toluene or MEK. Apply toluene or MEK with back-and-forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow areas to dry between applications.

2. Prepare cement and accelerator mixture. Prepare only enough mixture for 8 hours, as this is the effective active period for the mixture. Dispose of any remaining mixture at this time.

3. Using a disposable brush, apply adhesive to completely cover surfaces to be cemented. Use long one-directional strokes and complete each surface before adhesive becomes tacky as the brush may pull tacky adhesive from the surface. Allow to dry for ten minutes.

4. Apply a second coat of adhesive as in [step 3](#). Use brush strokes perpendicular to the original direction.

5. When second coat of adhesive has become tacky, place pieces together. If cemented area is a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden roller.

6. Allow adhesive to cure a minimum of 48 hours.

7. Dust area with talc.

8-52. PATCHING LIFERAFTS. To patch inflatable survival equipment, select color to approximately match item to be patched, and proceed as follows:

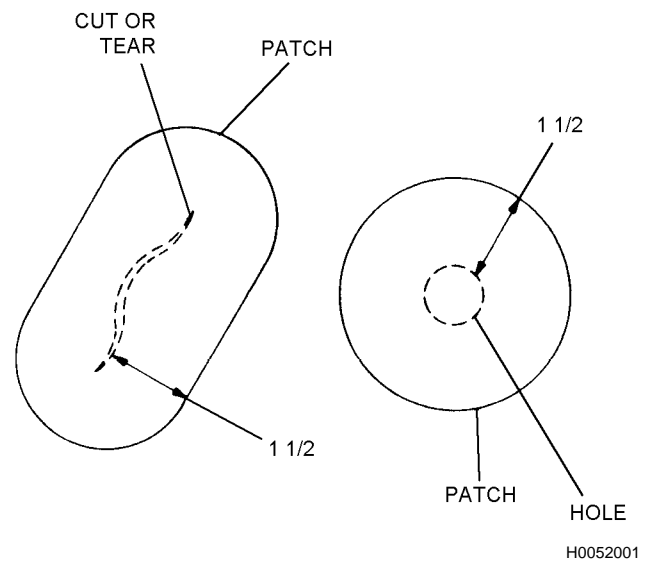
Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
	-or-	
	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489



Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-12/A life-raft.

1. Cut a rounded patch 1 1/2 inches larger than the damage on all sides.



Step 1 - Para 8-52

2. Scallop edges of patch if it is larger than 5 inches in diameter.

3. If damaged area in floor is larger than 1 inch, patches shall be applied to both sides.

4. Center patch over damage and trace on outline of patch on fabric.

5. Cement patch to damaged area in accordance with [paragraph 8-51](#).

6. Dust area with talc.

7. Perform a leakage test.

8-53. RECEMENTING OR REPLACING SEAM TAPES. This repair shall be performed only if a flotation tube does not leak, that is, if only the outer seam tape is loose, or if the seam does not seal a flotation tube. To recement or replace a seam tape, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or- Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589

NOTE

Seam separation in floors and seats may be repaired provided safety and flotation capabilities are not compromised. Exercise sound judgement in determining whether such repairs are within local capabilities. All cementing shall be performed in accordance with [paragraph 8-51](#).

1. If tape is present and undamaged, recement tape to liferaft.
2. If tape is missing, measure and fit a replacement tape to area and cement in place. Overlap other seams a minimum of 1 inch.



Do not use toluene or MEK near open flame, heat, or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Avoid excessive application of toluene or MEK on seams. Remove any spilled or excessive toluene or MEK immediately.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

3. If tape is damaged, peel damaged tape from liferaft. Apply toluene or MEK only as needed to loosen tape. Trim damaged tape and replace with new tape. Overlap other seam tape a minimum of 1 inch.
4. Perform leakage test.

8-54. SEA ANCHOR/MOORING LINE REPLACEMENT. To replace worn or damaged sea anchor or mooring line, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Sea Anchor, Type I, Size 1	MIL-A-3339
As Required	Cord, Nylon Type III	MIL-C-5040 NIIN 00-240-2146

1. (Complete Assembly Replacement) Secure free end of mooring line to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.
2. (Mooring Line Replacement Only) Sear both ends of a 16-foot length of MIL-C-5040 Type III nylon cord. Secure one end to sea anchor bridle, and other end to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

8-55. INSPECTION RECORD PATCH.

NOTE

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life-rafts. The requirement for all other record documentation remains unchanged. The reason for this change is that most Inspection Record Patches are unreadable, and the packer's and inspector's names, including the type of inspection (leak/functional), are documented on Aviation Crew Systems Records.

Figure 8-10. Deleted



8-56. ADDITION OF INTERNATIONAL MORSE CODE PATCH. To fabricate and install an International Morse Code patch, proceed as follows:

Materials Required

Quantity	Description	Reference Number
8 x 5 inches	Cloth, Nylon, Var. C, Rubber-Coated, Orange	MIL-C-23070 NIIN 00-926-6489
As Required	Ink, Black, Waterproof	SPE-92 NIIN 00-161-4229

1. ~~Remove~~ markings (see [figure 8-11](#)) on ~~uncolored~~ side of patch using black waterproof ink.

NOTE

If ~~replacing~~ a worn or ~~abraded~~ International Morse Code patch, a new International Morse Code patch shall be cemented directly on top of old patch.

2. Mark on 8 x 5-inch area at location stated in [table 8-3](#) and shown in [figure 8-2](#).

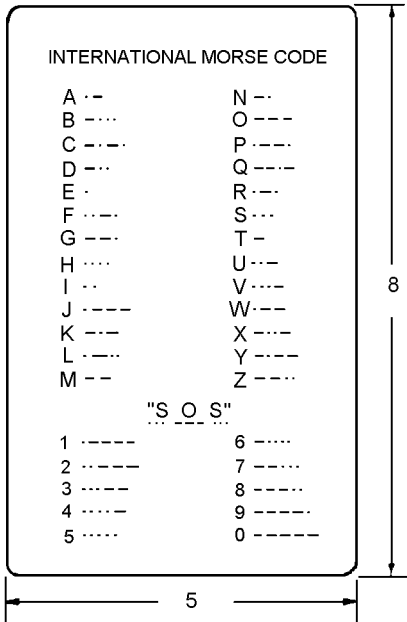


Figure 8-11. International Morse Code Patch

10080011

NOTE

Cement applications shall be performed in accordance with [paragraph 8-51](#).

3. Cement International Morse Code patch to marked area on liferaft so top is up and patch is readable from inside raft.

8-57. RELOCATION OF LIFERAFT RETAINING LINE INSTRUCTION TAG. To relocate retaining line instruction tag, proceed as follows:

Materials Required

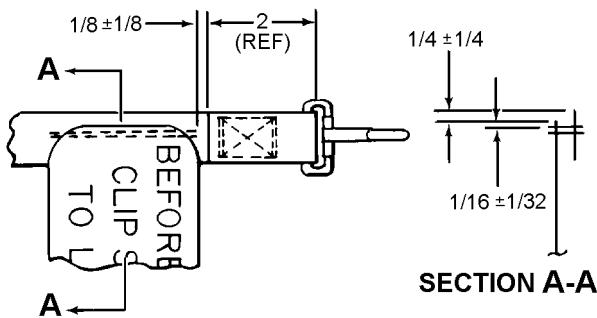
Quantity	Description	Reference Number
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

1. Remove the instruction tag from the snaphook.

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

2. Position instruction tag on retaining line and attach using two rows of stitches.



H0057002

8-58. FABRICATION OF PAINTER LINE POUCH. Painter lines shall be installed on all multi-place liferafts. To fabricate the painter line pouch, proceed as follows:

Materials Required

Quantity	Description	Reference Number
5 x 20 inches	Leatherette, Class 2 or Herculite No. 80, Grey	CCC-A-700
53 inches	Tape, Pile, 3/4 inch	MIL-F-21840
41 inches	Tape, Hook, 3/4 inch	MIL-F-21840
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
1	Snaphook, Wire Body, Fixed Loop Eye, Flat Spring Closure, With Retainer	MIL-S-43770/1-C WBC1
60 feet	Cord, Nylon, Type I	MIL-C-5040 NIIN 00-240-2154

NOTE

All stitching shall be done with size E nylon thread (V-T-295, Type II), using 8 to 10 stitches per inch.

1. Cut and stitch hook and pile tape along edge of material. See [figure 8-12](#).

2. Stitch two 9-inch lengths of hook tape 1 1/4 inch from sides. See [figure 8-12](#).

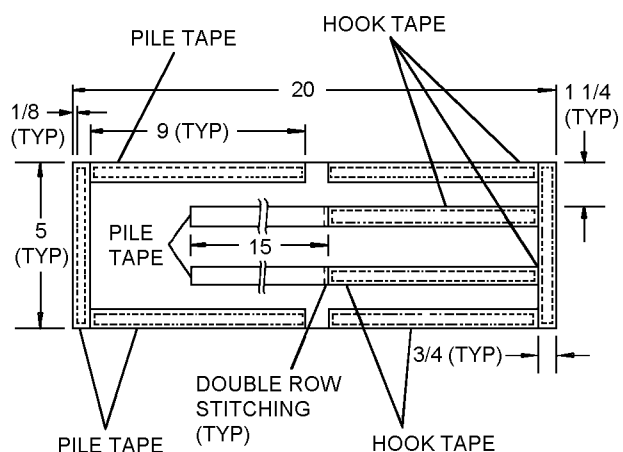
NOTE

Stitch pile tape on one end only.

3. Position face up a 15-inch length of pile tape at inner end of each inside strip of hook tape. Secure inner end of each pile tape to material with double row of stitching. See [figure 8-12](#).

4. Form 1/2-inch wide hesitator loops, 1/8 inch apart. Press hook and pile tape together between loops. See [figure 8-13](#).

5. Stow painter line, making 3 1/2-inch bights, placing 8 folds in each hesitator loop. See [figure 8-13](#).



10080012

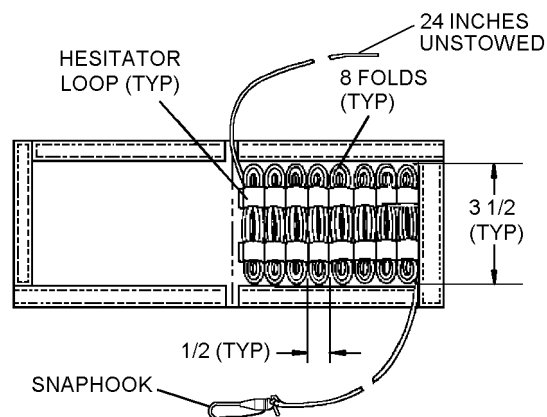
Figure 8-12. Painter Line Pouch

6. Leave 24 inches of line unstowed at each end for securing painter line to liferaft and aircraft. See [figure 8-13](#).

7. Fold material in half, forming pouch, and leave unstowed ends outside pouch. Press hook and pile tape together.

8. Attach snaphook to one end of unstowed painter line extending from pouch with a bowline knot.

8-59. DRILLING HOLES IN P/N A128-RT-1 PULL CABLE HOUSING. To drill holes in P/N A128-RT-1, proceed as follows:



10080013

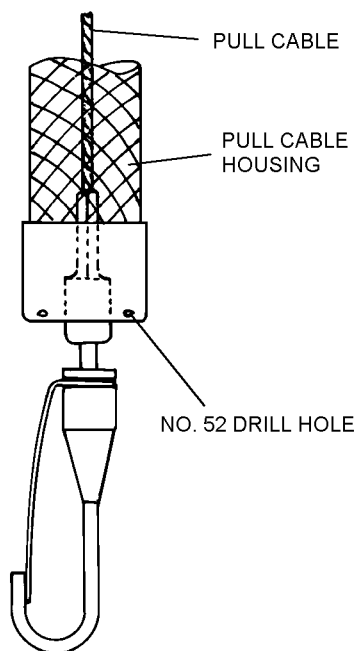
Figure 8-13. Stowed Painter Line

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Using a no. 52 drill, drill two holes in pull cable housing.

2. Safety-wire pull cable housing in accordance with [paragraph 8-46](#).



Step 1 - Para 8-59

H0059001

8-60. DRILLING HOLES IN P/N IV0303 (VEE Mfg.) INFLATION VALVE. To drill holes in P/N IV0303 (VEE Mfg.) inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.
2. Remove cover plate and plastic dust shield from valve.
3. Using a no. 52 drill, drill two holes in cover plate and plastic dust shield. See [figure 8-14](#).
4. Remove cam screw from sheave assembly.

WARNING

Care must be taken not to rotate cam.

5. Remove release cable from around valve sheave assembly.
6. Carefully remove tru-arc ring from stem on valve body.
7. Remove valve sheave from valve body.

NOTE

Section line B-B through the center of the screwdriver slot and the center of the screw hole. A starter hole will be necessary to seat the drill prior to drilling the angled hole.

8. Using a no. 52 drill, drill a hole at a 60° angle in valve sheave. See [figure 8-14](#).

CAUTION

Valve cover plate is not interchangeable between manufacturers.

9. Install valve sheave, tru-arc ring, release cable, cam screw, plastic dust shield, and cover plate. See [paragraph 8-46](#) for proper safety-wiring.
10. Connect inflation valve to manifold.

8-61. DRILLING HOLES IN P/N A128 INFLATION VALVE. To drill holes in P/N A128 inflation valve, proceed as follows:

WARNING

Do not rotate cam or depress poppet stem.

5. Remove valve sheave from valve.

6. Using a no. 52 drill, drill a hole at a 23° angle in the valve sheave. See [figure 8-15](#).

7. Install valve sheave, cable, and cover plate. See [paragraph 8-46](#) for proper safety-wiring.

8. Connect the inflation valve to manifold.

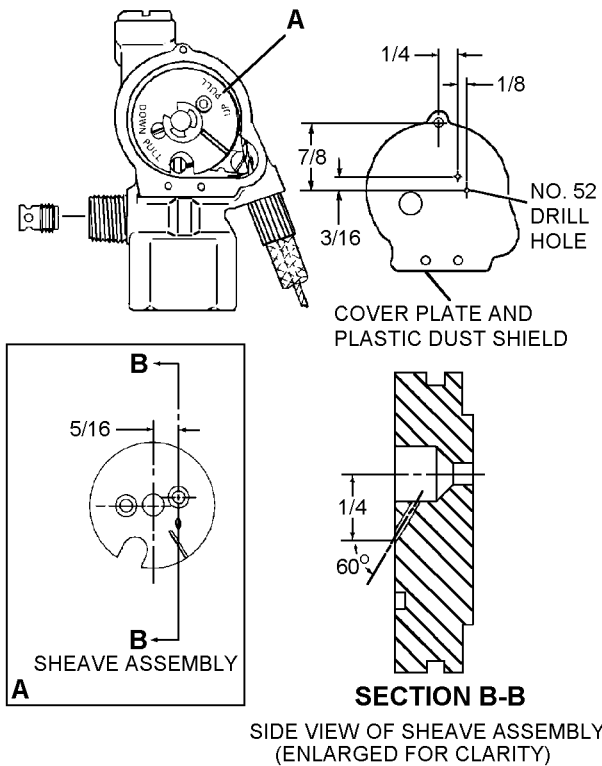


Figure 8-14. Drilling IV0303 Inflation Valve

10080014

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.

2. Remove cover plate from valve.

3. Using a no. 52 drill, drill two holes in cover plate. See [figure 8-15](#).

4. Remove release cable from around valve.

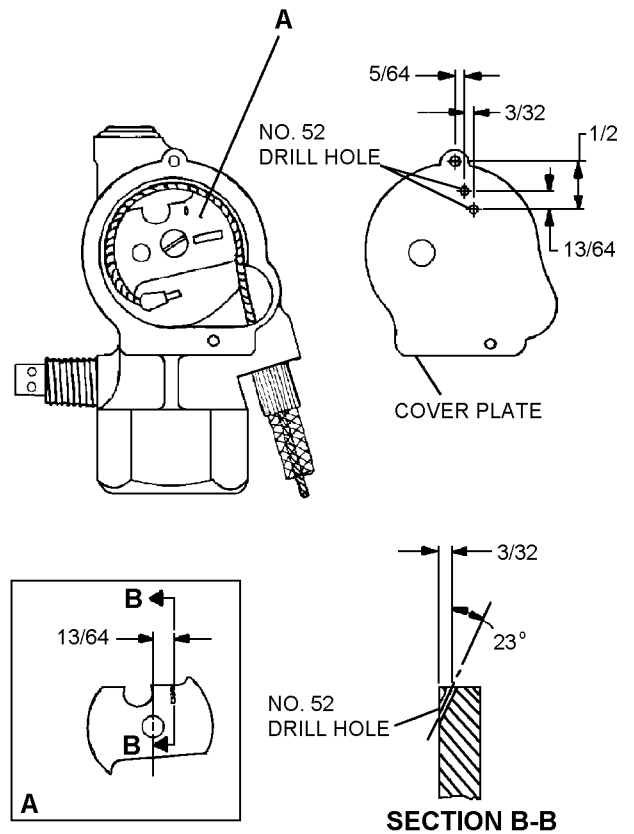


Figure 8-15. Drilling A128 Inflation Valve

10080015

8-62. DRILLING HOLES IN P/N 871444 INFLATION VALVE. To drill holes in part number 871444 inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

- 1. Disconnect inflation valve from manifold.
- 2. Remove cover plate from valve.

NOTE

- Position of holes in cover plate depends on type of pull used (up-pull or down-pull).
- 3. Using a no. 52 drill, drill two holes in cover plate. See [figure 8-16](#).
 - 4. Remove release cable from around valve sheave.

WARNING

- Do not rotate cam or depress poppet stem.
- 5. Remove valve sheave from valve.
 - 6. Using a no. 52 drill, drill a hole at an 18° angle in valve sheave. See [figure 8-16](#).
 - 7. Install valve sheave, cable and cover plate. See [paragraph 8-46](#) for proper safety-wiring.
 - 8. Connect inflation valve to manifold.

8-63. FABRICATION OF CYLINDER VALVE ANTI-CHAFING SLEEVE. To fabricate a cylinder valve anti-chafing sleeve, proceed as follows:

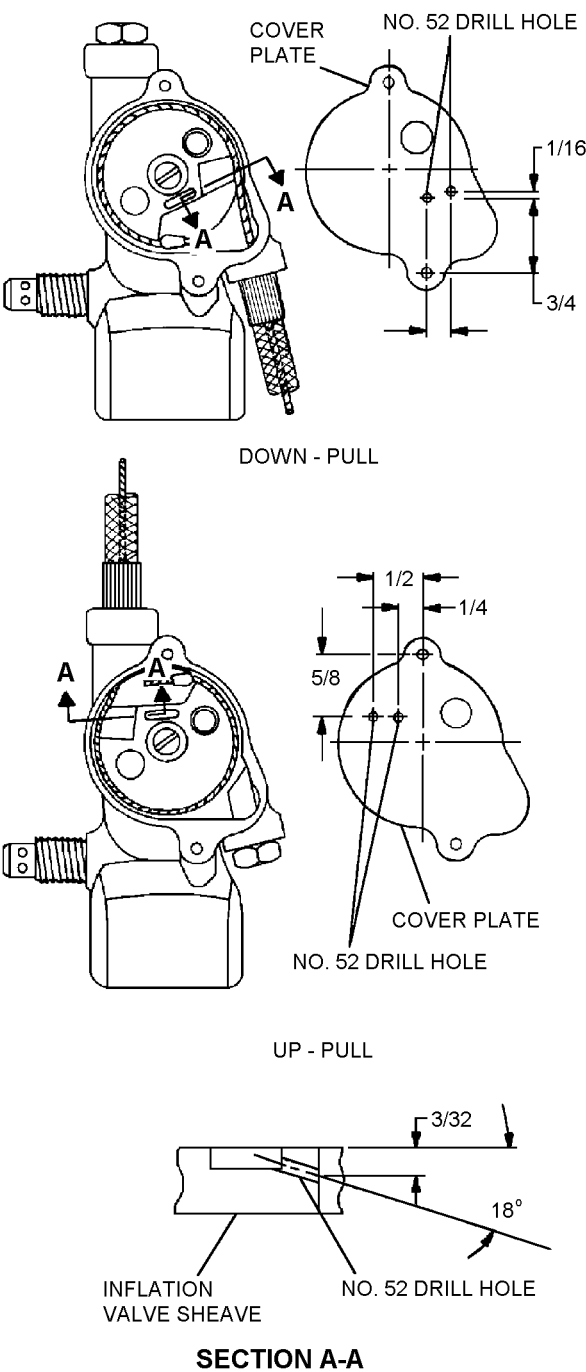


Figure 8-16. Drilling 871444 Inflation Valve

10080016

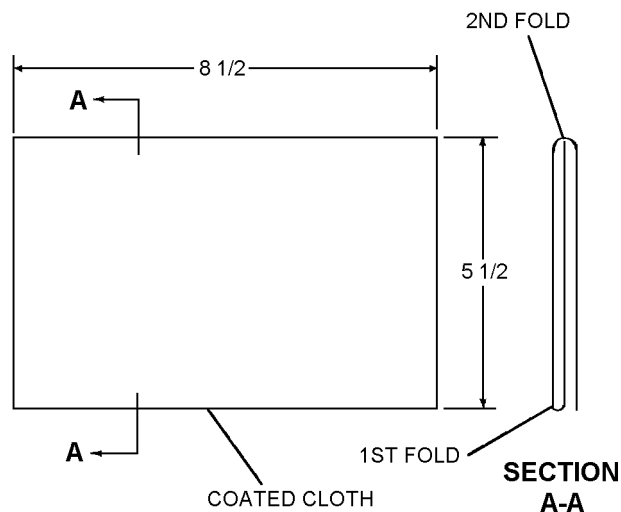
Materials Required

Quantity	Description	Reference Number
16 1/2 x 8 1/2 inches	Cloth, Laminated Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
	-or-	
	Cloth, Laminated Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489
1	Punch, Cutting, Type I, Class B, Style 1, Size 13	GGG-P-833A NIIN 00-180-0927
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

1. Make two folds in the nylon rubber-coated cloth, each fold being 5 1/2 inches as shown.

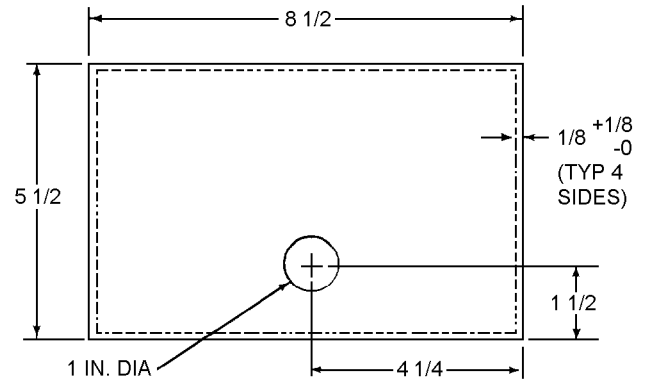


Step 1 - Para 8-63

H0063001

2. Sew a 1/8-inch inboard border row of stitching around the perimeter of the assembly.

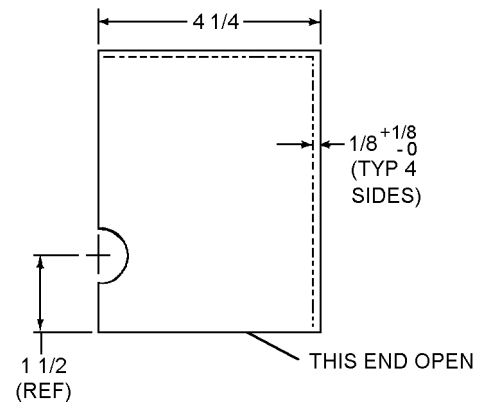
3. Position assembly on cutting board and punch a 1-inch diameter hole through all three layers of material.



H0063003

Step 3 - Para 8-63

4. Fold assembly in half and sew a 1/8-inch row of stitching inboard from edge on end and side.



H0063004

Step 4 - Para 8-63

8-64. FABRICATION OF 10-FOOT RETAINING LINE. To fabricate a 10-foot retaining line, proceed as follows (see figure 8-17):

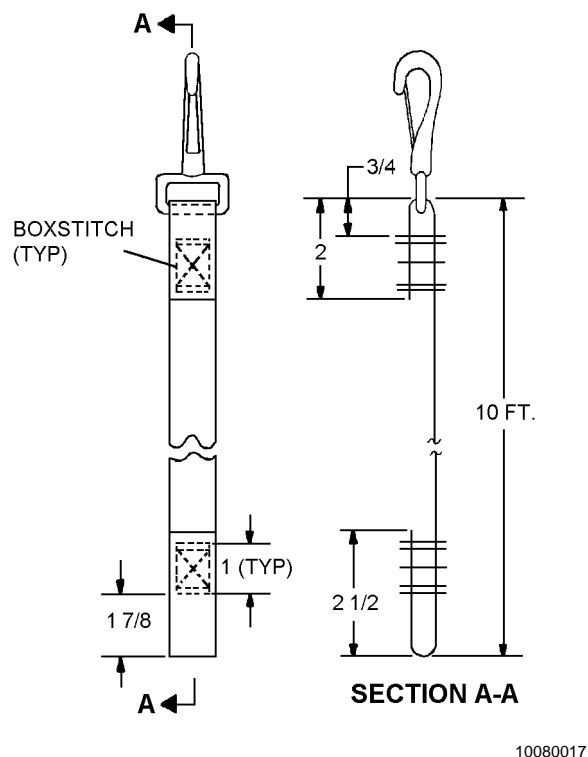


Figure 8-17. 10-Foot Retaining Line

Materials Required

Quantity	Description	Reference Number
10 feet 4 1/2 inches	Webbing, Nylon, Type II, 1-inch	MIL-W-4088
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
1	Snaphook	M43770/1-CWBC3

1. Using dimensions shown, pass one end of nylon webbing through snaphook and boxstitch.

2. Using dimensions shown, fold opposite end over and boxstitch, forming a loop.

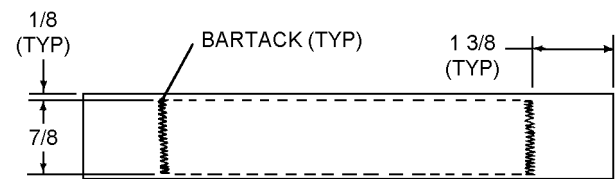
8-65. FABRICATION OF BOARDING HANDLE ASSEMBLY. To fabricate a boarding handle assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Nylon, Type II, 1-inch	MIL-T-5038
As Required	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
-or-	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
-or-	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589
1	Disposable Brush	NIIN 00-514-2417

1. Sear-cut two 12-inch pieces of nylon tape for handle.

2. Stitch the two 12-inch lengths of nylon tape together, using 6 to 10 stitches per inch, leaving a space of 1 3/8 inches from each end. Sew in a 7/8-inch bartack 1 3/8 inches from each end.

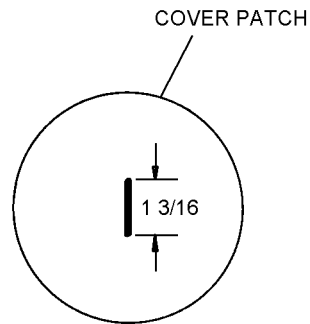


Step 2 - Para 8-65

H0065002

3. Cut two 5-inch diameter discs for the cover patch and two 3-inch diameter discs for the base patch from orange nylon liferaft cloth.

4. On centerline of the two 5-inch diameter cover patches make a slit 1 3/16 inches in length.

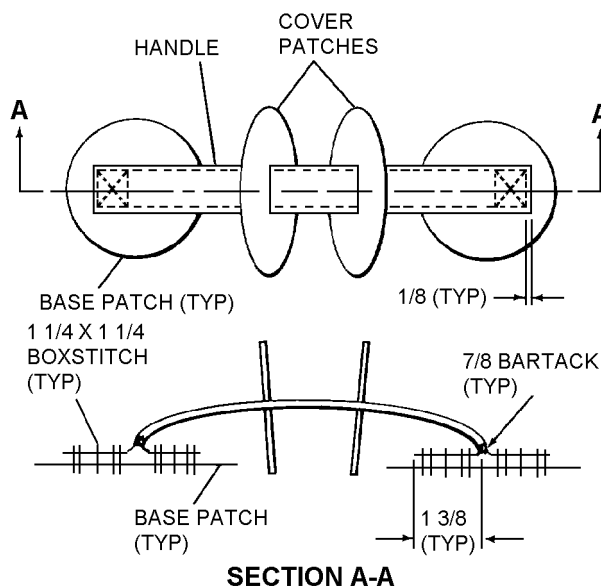


H0065004

Step 4 - Para 8-65

5. Insert handle through slit in each cover patch.

6. Separate ends of handle and stitch to each base patch.



H0065006

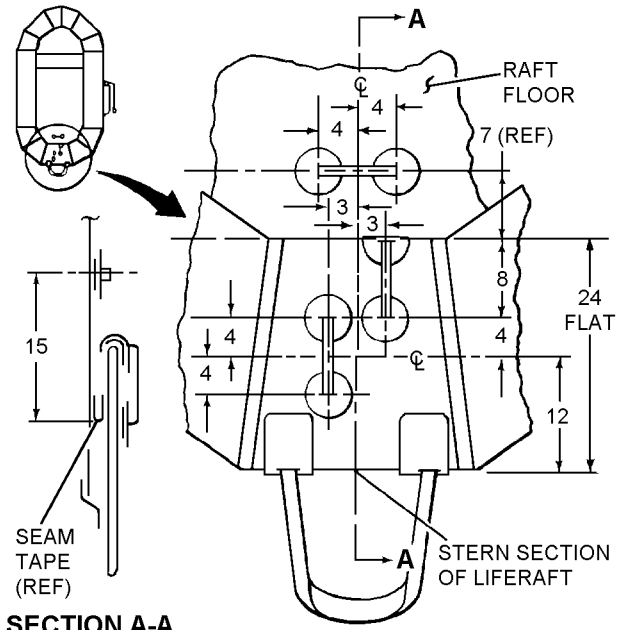
Step 6 - Para 8-65

NOTE

Cement applications shall be performed accordance with [paragraph 8-51](#).

7. Cement boarding handle cover patches to their respective base patches.

8. Position boarding handle on liferaft and cement in place.



H0065008

Step 8 - Para 8-65

9. Dust area with talc.

8-66. FABRICATION OF BOARDING STIRRUP ASSEMBLY. To fabricate a boarding stirrup assembly, proceed as follows:

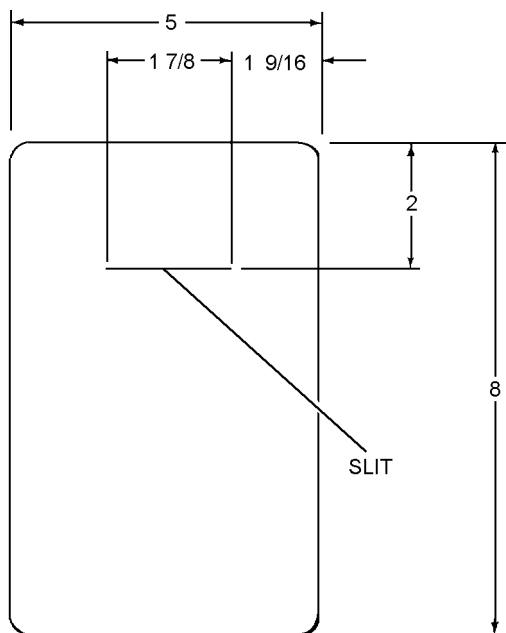
Materials Required

Quantity	Description	Reference Number
As Required	Webbing, Nylon, Type XII, 1 23/32 inches	MIL-W-4088
As Required	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
	-or-	
	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 926-6489
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589
1	Disposable Brush	NIIN 00-514-2417

NAVAIR 13-1-6.1-1

1. Cut two 8 x 5-inch cover patches and two 7 x 4-inch base patches from the orange nylon liferaft cloth.

2. Cut a 1 7/8-inch slit in each of the 8 x 5-inch cover patches.

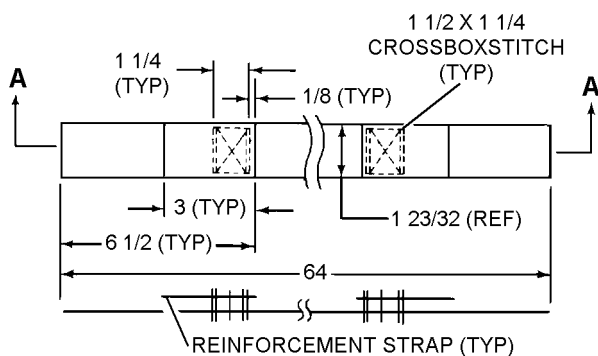


H0066002

Step 2 - Para 8-66

3. Sear-cut two 3-inch lengths and one 64-inch length of nylon webbing.

4. Position and stitch 3-inch reinforcement strap to 64-inch boarding stirrup strap with a 1 1/2 x 1 1/4-inch crossboxstitch pattern.



SECTION A-A

Step 4 - Para 8-66

H0066004

5. Slip two 8 x 5-inch cover patches onto boarding stirrup strap and slide them out of the way.

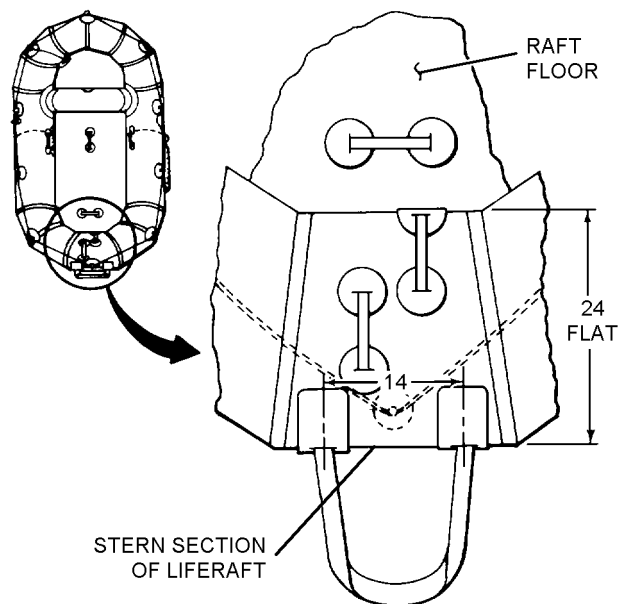
6. Stitch reinforcement strap to 7 x 4-inch base patch with a 1 1/2 x 3/4-inch boxstitch pattern. Stitch boarding stirrup strap to base-patch with a 1 1/2 x 4 3/4-inch crossboxstitch pattern. See [figure 8-18](#).

NOTE

Cement applications shall be performed in accordance with [paragraph 8-51](#).

7. Cement 8 x 5-inch cover patches to their respective base patches.

8. Position boarding stirrup assembly on liferaft and cement in place.



H0066008

Step 8 - Para 8-66

9. Dust area with talc.

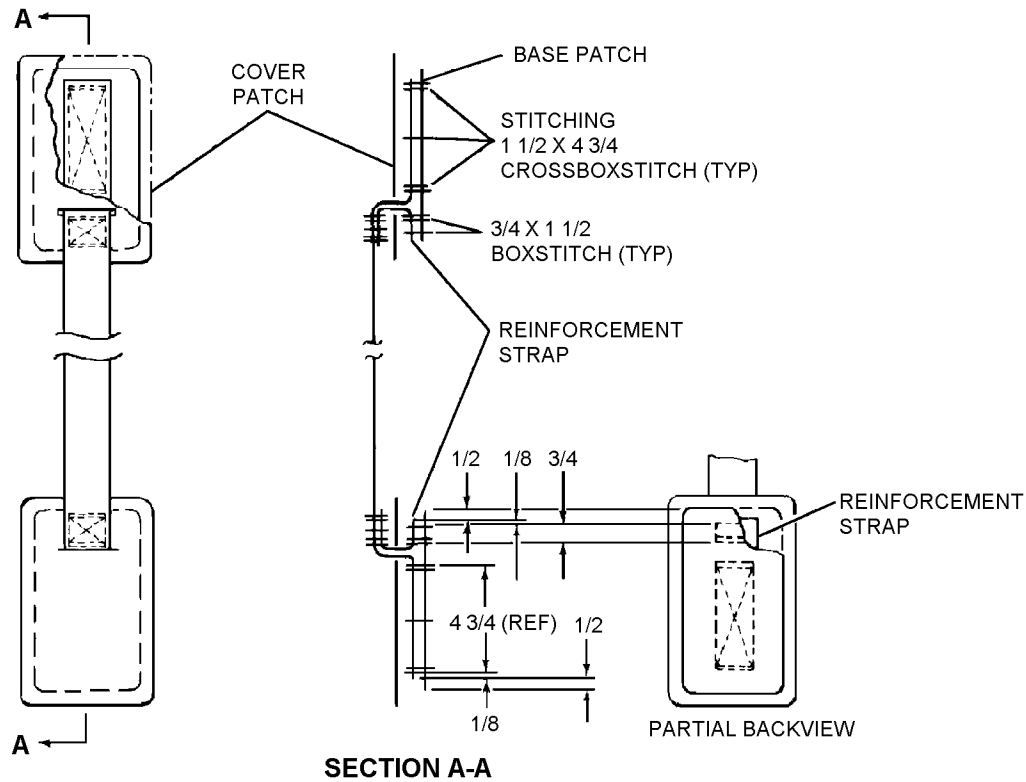


Figure 8-18. Fabrication of Boarding Stirrup Assembly

10080018

8-67. FABRICATION OF RIGHTING LINE. To fabricate the righting line, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
12 feet	Rope, Nylon, Type I, 3/4-inch Circumference, Natural Color	MIL-R-17343 NIIN 00-618-0261

1. Securely tie righting line to liferaft lifeline with a bowline knot on port side opposite manifold (midway between the two lifeline patches). See [figure 8-2](#).

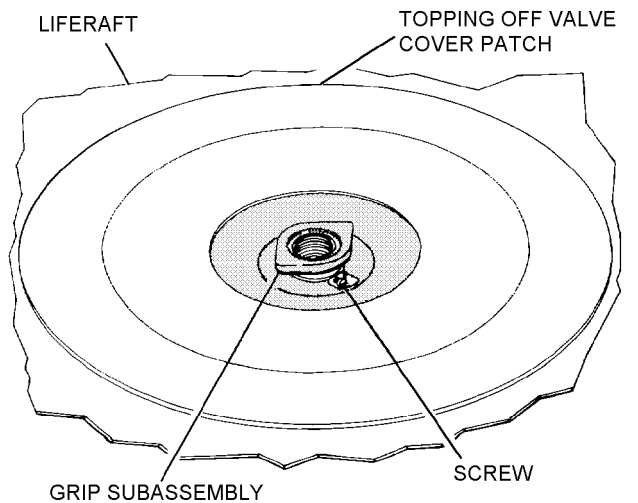
2. Tie two overhand knots, the first knot 1 foot from the free end and the second knot 1 foot from the first. The finished length of the knotted righting line shall be 10 feet 6 inches \pm 6 inches long. To avoid fraying, sear all cut edges. Do not form sharp edges.

8-68. REPLACEMENT OF TOPPING-OFF VALVE. To replace a damaged or corroded topping-off valve, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
1	Grip Subassembly (See Note)	MS22054-3
1	Washer (See Note)	MS22054-7
1	Screw (See Note)	MS22054-9
As Required	Applicator, Wood, Cotton-tipped	GGA-616D
As Required	Toluene	TT-T-548 NIIN 00-281-2002
-or-		
As Required	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913

Note: This component is part of parts kit, P/N 1106AS110-1 (CAGE 30003) NIIN 01-128-5331.

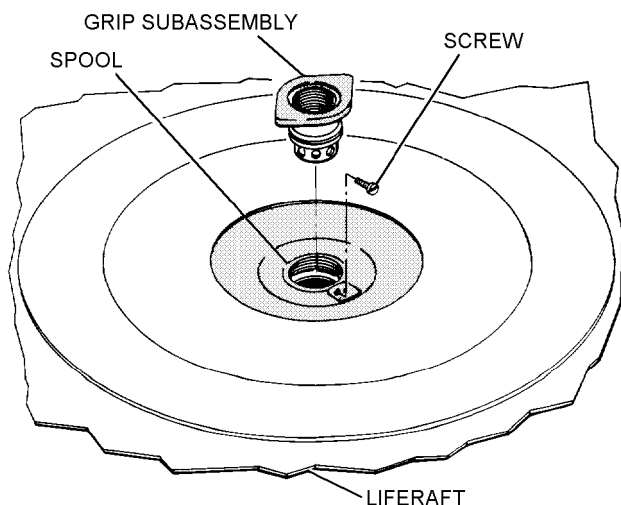
1. Ensure that grip subassembly is in closed position.



Step 1 - Para 8-68

H0068001

2. Turn grip subassembly clockwise approximately 1 1/2 turns.
3. Remove screw from side of spool.



Step 3 - Para 8-68

H0068003

4. Unscrew and remove grip subassembly from spool.



Do not use toluene or MEK near open flame, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



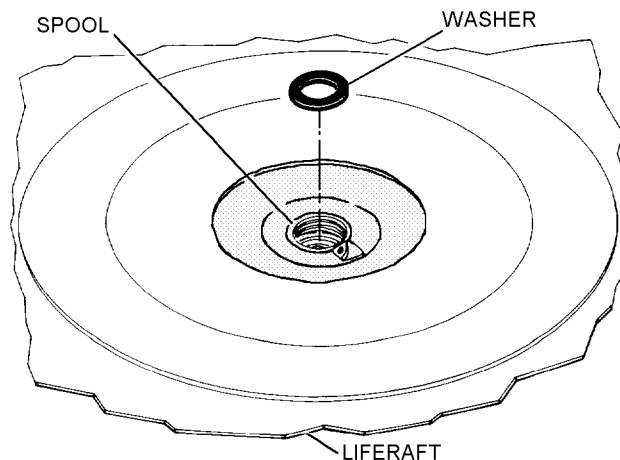
To avoid damaging valve threads, care should be taken when inserting instrument to remove washer.

Use only enough toluene to loosen washer. Ensure that no toluene, MEK, or congealed masses of adhesive enter the opening at the bottom of spool.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

5. Remove washer located in bottom of spool. If necessary, use toluene or MEK to assist in removal.



Step 5 - Para 8-68

H0068005

6. Insert an applicator or similar instrument dipped in toluene or MEK into spool and swab washer seating area to remove old adhesive.

7. Apply adhesive, using an applicator or similar instrument, to washer seating area on inside bottom of spool.

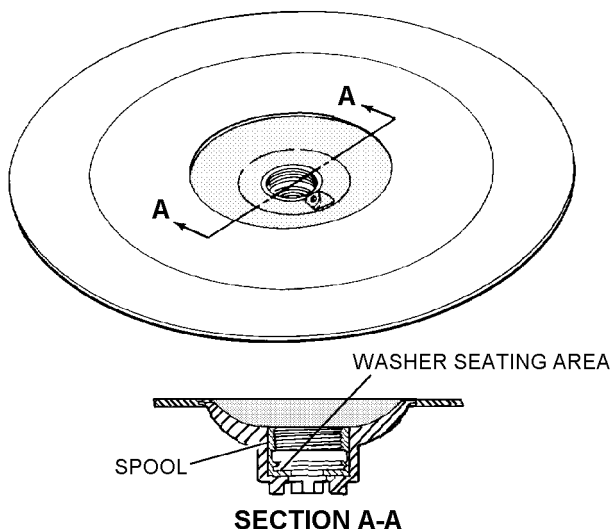


Do not use sharp instrument to insert washer into seating area.

NOTE

Ensure that the washer is properly seated on to bottom of spool and that the threads and opening are free of adhesive.

8. Insert washer into washer seating area.



H0068008

Step 8 - Para 8-68

9. Screw grip subassembly counterclockwise into spool until it closes.

10. Turn grip subassembly clockwise approximately 1 1/2 turns.

11. Tighten screw into side of spool till snug.

12. Ensure proper operation of topping-off valve.

13. Perform leakage test in accordance with [paragraph 8-34](#).

8-69. REPAIR PROCEDURES FOR CARRYING CASE HANDLES. To replace or repair the carrying case handles, proceed as follows:

Materials Required

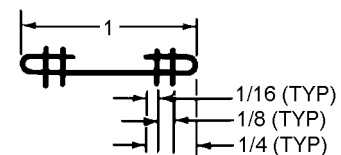
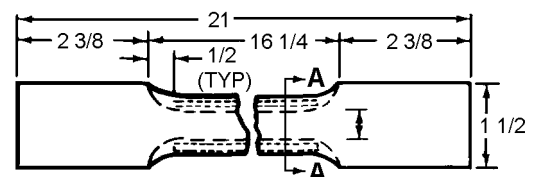
Quantity	Description	Reference Number
As Required	Webbing, Nylon, Type I, 1 1/2 inches wide	MIL-W-21733 (Optional matl. MIL-W-17337)
As Required	Cloth Laminated Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

1. Cut eight 3 1/2-inch diameter circles from laminated cloth (MIL-C-23070).

2. Stitch cloth circles in place on inner and outer sides of carrying case with centers 14 3/4 inches from outside seam edge and 8 3/4 inches down from top seam edge on right side; 6 1/2 inches down from top seam edge on left side.

3. Cut two 21-inch lengths of nylon webbing, 1 1/2 inches wide (MIL-W-21733).

4. On each length, fold 1/4 inch of material under on both sides commencing 2 3/8 inches from end and continuing for 16 1/4 inches. Stitch in place.

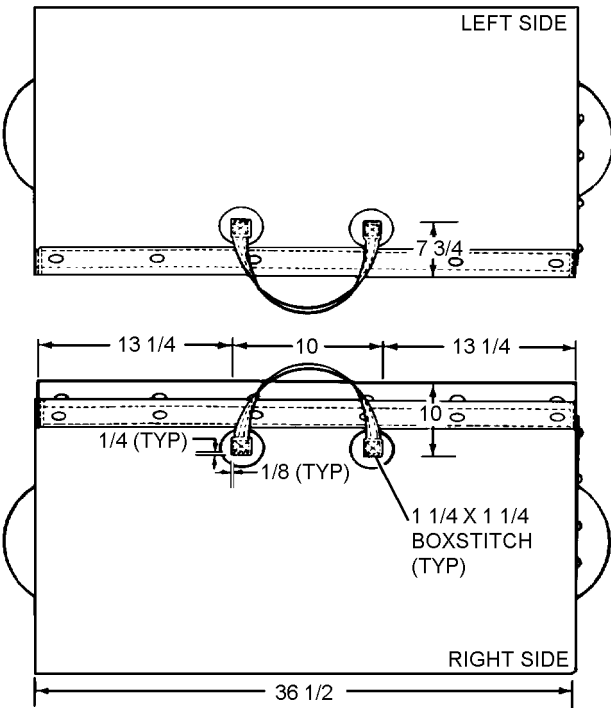


SECTION A-A

Step 4 - Para 8-69

H0069004

5. Stitch handle ends in vertical position on sides of case on top of reinforcement circles, with outboard edge of handles 13 1/4 inches from outside seam edge and 10 inches apart; bottom edge of handles 10 inches down from top seam on right side and 7 3/4 inches down from top seam edge on left side. Use 1 1/4 x 1 1/4-inch boxstitch.

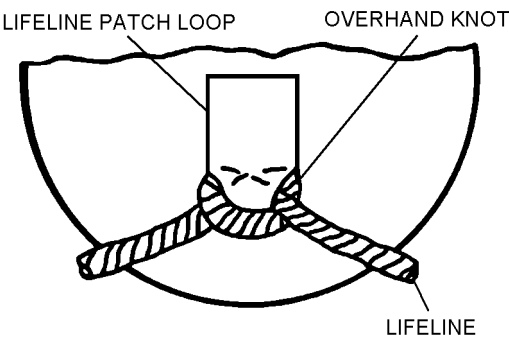


Step 5 - Para 8-69

8-70. REPLACEMENT/REPAIR OF LIFELINE. To replace or repair the lifeline on multiplace liferafts proceed as follows:

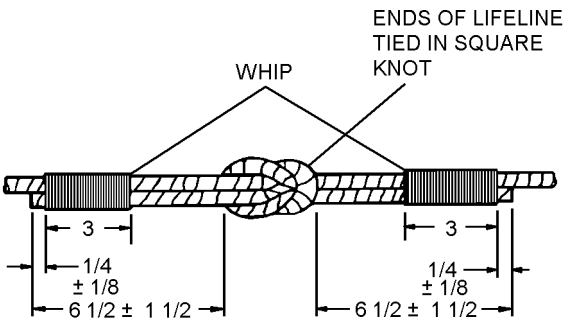
Materials Required		
Quantity	Description	Reference Number
As Required	Rope, Nylon, 3/4 inch circumference, Natural Color	MIL-R-17343 NIIN 00-618-0261
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

1. Inflate raft to test pressure.
2. Carefully remove damaged lifeline from all lifeline patch loops (overhand knot) and from righting line (bowline knot).
3. Thread nylon cord through all lifeline patch loops, tying an overhand knot around each loop. Leave 2 inches \pm 1 inches slack in lifeline between each lifeline patch loop.



Step 3 - Para 8-70

4. Secure ends of lifeline with a square knot midway between lifeline patch loops leaving 6 1/2 inches \pm 1 1/2 inches on each end of lifeline outside of knot.
5. Wrap (whip) the last 3 inches of 6 1/2 inch loose ends with Type II size E nylon thread to secured lifeline. A length of 1/4 inch \pm 1/8 inch of bitter end will extend beyond the whip.



Steps 4 and 5 - Para 8-70

6. Secure righting line to new lifeline with bowline knot (Refer to [paragraph 8-67](#)).

8-71. REPLACEMENT OF LIFERAFT HEAVING LINE. To replace liferaft heaving line proceed as follows:

Material Required

Quantity	Description	Reference Number
75 feet	Cord, Nylon, Coreless Type I, 400 Lb. Test	MIL-C-7515

1. If required, untie bowline knot and remove defective heaving line from attachment loop in heaving line pocket on main tube of liferaft.

2. Using bowline knot secure one end of replacement line to attachment loop in heaving line pocket.

3. Secure heaving line grommet to opposite end of heaving line using bowline knot.

4. Fake heaving line on flat surface using into 13-inch bights. Gather the line and place rubberband around each end one to two inches from end of bights.

5. Place heaving line in heaving line pocket under grommet. Close pocket and secure snaps.

8-72. REPLACEMENT OF LOCKING CONES (LIFERAFT CASES). To replace damaged locking cones on liferaft cases, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nylon 3-Cord	V-T-295
As Required	Cone, Locking	NIIN 00-095-0075-LX

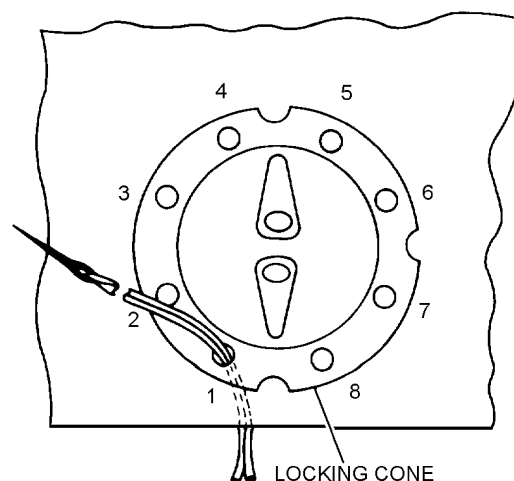
1. Cut and remove tacking holding damaged cone to life raft case. Remove damaged cone.

NOTE

If fabric supporting locking cone is damaged, fabricate and install a reinforcing patch on inside of case.

2. Position new locking cone in exact location of damaged or missing cone. Ensure locking pin hole in apex of cone is properly aligned.

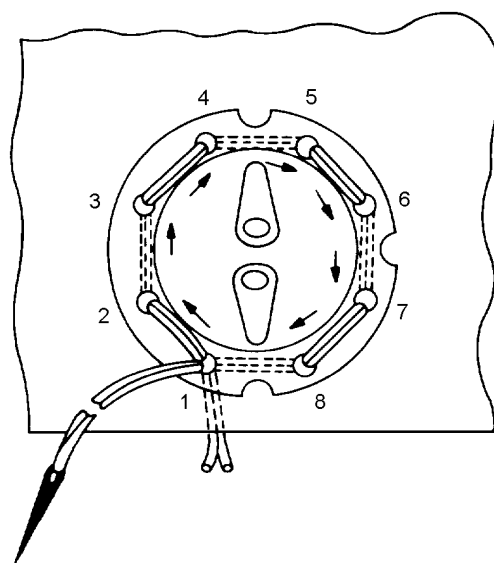
3. Push needle, threaded with waxed nylon 3-cord (V-T-295) doubled, up through panel and through hole 1 in locking cone. Pull needle and thread through hole until approximately three inches of thread remains on underside of panel.



H0072003

Step 3 - Para 8-72

4. Working clockwise, pass needle down through hole 2, up through hole 3. Continue until all holes are threaded, and needle passes up through hole 1. Take up all slack in thread.

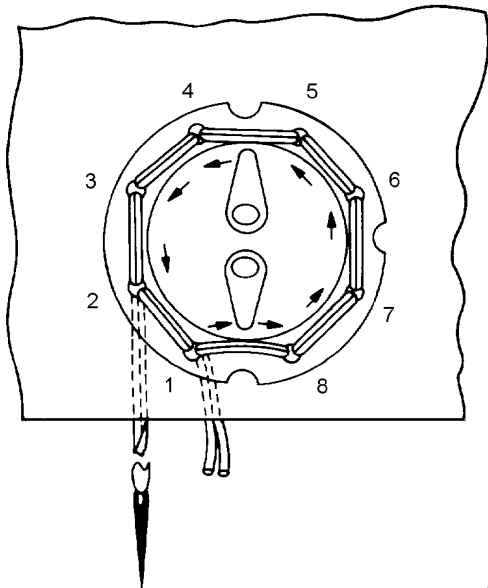


H0072004

Step 4 - Para 8-72

NAVAIR 13-1-6.1-1

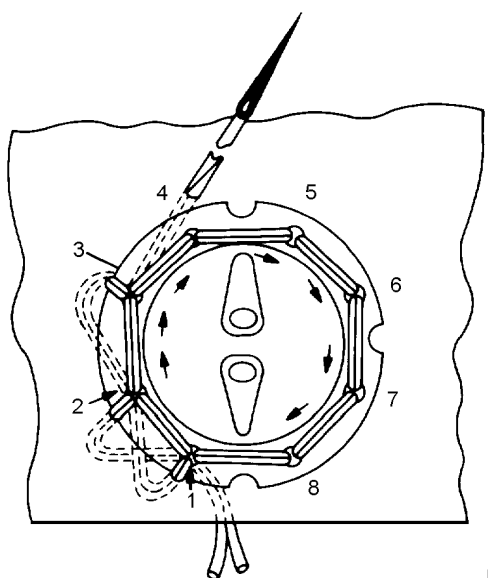
5. Working counterclockwise, pass needle down through hole 8, up through hole 7. Continue until needle passes down through hole 2. Take up all slack in thread.



Step 5 - Para 8-72

H0072005

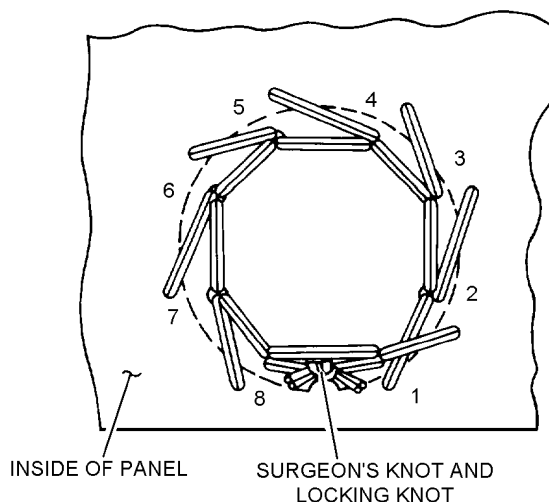
6. Pass needle up through panel at outside edge of cone directly adjacent to hole 1. Working clockwise, pass needle down through hole 1 and up through panel adjacent to hole 2, then down through hole 2. Continue stitching in this manner until needle passes down through hole 8. Take up all slack in thread.



Step 6 - Para 8-72

H0072006

7. Tie ends of thread on inside of panel with surgeon's knot followed by a square knot. Trim thread ends 1/4 inch from knot.



Step 7 - Para 8-72

H0072007

8-73. PACKING LRU-12/A LIFERAFT.

8-74. The LRU-12/A liferaft assembly may be packed in droppable configurations (hand-launched) for down-pull or for installation into aircraft liferaft compartments. The method used depends upon aircraft application. The LRU-12/A shall be packed by qualified personnel at the lowest level of maintenance possible. For cleaning and servicing, refer to [paragraph 8-38](#).

8-75. PACKING PROCEDURE FOR LRU-12/A LIFERAFT (DROPPABLE). To pack an LRU-12/A liferaft assembly (droppable), proceed as follows:

1. Ensure that liferaft, carrying case, and accessory container have been inspected in accordance with [paragraph 8-13](#).

2. Ensure that survival items and liferaft accessories have been inspected for expiration and damage. Refer to [table 8-5](#) for items used.

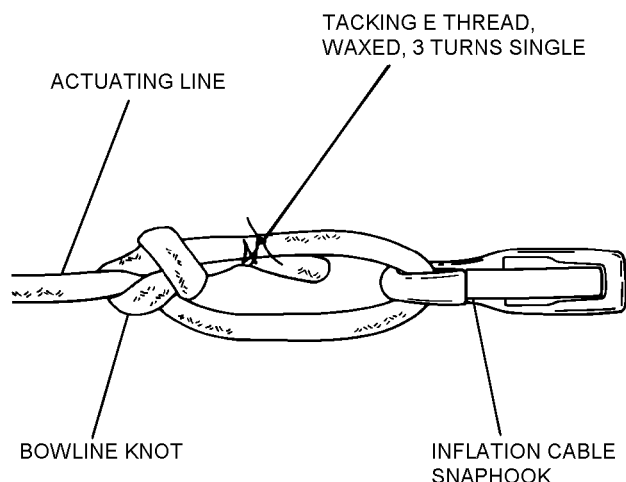
NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modification to the survival items.

3. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap (NIIN 00-142-9008) and secure with rubber bands. Stow accessories and survival items in accessory container and supply pocket. Tie hand pump, installed radio(s) and Manual Reverse Osmosis Desalinator (MROD) to accessory container grommet with a 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

4. Ensure that inflation valve pull cable is routed for down-pull, see [figure 8-9](#).

5. Attach a 34-inch actuating line (MIL-C-5040 Type III nylon cord) to inflation assembly snaphook with a bowline knot. Tack with three turns of waxed size E nylon thread, single. Tie off tacking with a surgeon's knot followed by a square knot.



Step 5 - Para 8-75

H0075005

WARNING

Wrap only the snaphook. Tape which extends to the pull cable housing will impede proper actuation of the liferaft inflation assembly.

6. Wrap pull cable snaphook with a layer of wide paper tape to prevent snaphook from hanging up inside carrying case after connection.

7. Attach retaining line to neck of CO₂ cylinder with a lark's head knot.

8. Ensure that cylinder valve anti-chaffing sleeve is installed.

9. Fake retaining line, righting line, and sea anchor mooring line, and secure with rubber bands.

10. If heaving lines are installed, stow heaving lines in heaving line pockets as follows:

a. Secure the loose end of the heaving line to the loop in the bottom of the heaving line pocket with a bowline knot.

b. Remove all twists and tangles from heaving line and grommet.

c. Fake the heaving line in 11 to 13 inch bights on a flat surface starting 12 to 15 inches from the loop in the bottom of the heaving line pocket.

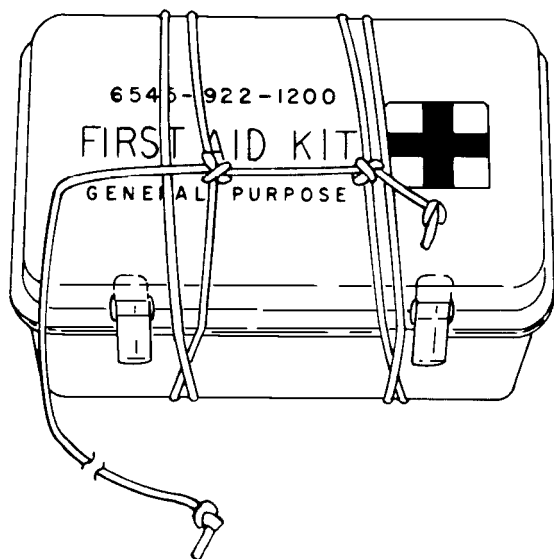
d. Continue faking until 15 to 21 inches of line remains, measured from last bight of line to the grommet.

e. Gather the heaving line and place a doubled 2-inch diameter rubber band over the heaving line 1 to 2 inches from each end of the bights.

f. Place the heaving line under the grommet in the heaving line pocket and close the pocket.

11. Ensure that all topping-off valves are closed and liferaft is completely deflated.

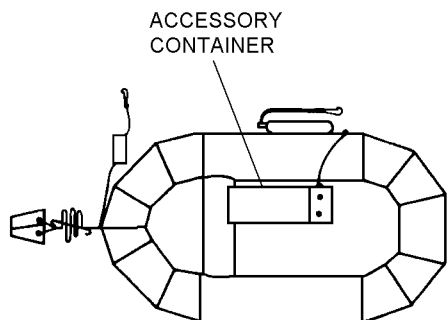
12. Secure latches on first aid kit with several layers of pressure-sensitive tape (NIIN 7510-00-266-5016). Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container grommet and secure with a bowline knot. Stow first aid kit in accessory container.



Step 12 - Para 8-75

H0075012

13. Stow accessory container in liferaft using 10-foot length of Type III Nylon cord, tie to nearest lifeline loop located next to CO₂ cylinder with a bowline knot.



Step 13 - Para 8-75

H0075013

14. Secure supply pocket to mating snap fasteners on raft bulkhead. Ensure slider pull tab on supply pocket is tied to nearest lifeline loop with a 60-inch length of Type III nylon cord using bowline knot on both ends.

NOTE

Painter lines shall be installed on all multi-place liferafts. The painter line shall be a 60-foot length of Type I, Nylon cord (MIL-C-5040, NIIN 00-240-2154). The painter line retains a deployed liferaft to the aircraft during emergency egress and is designed to break under a 100-pound pull if the aircraft sinks.

15. Stow painter line in painter line pouch by forming eight 3 1/2-inch bights in line; and inserting each bight in eight hesitator loops provided. Leave 30 inches of unstowed painter line at each end of pouch. See [figure 8-19](#). Close pouch; then secure with hook and pile tape provided.

16. Attach snaphook to one end of unstowed painter line extending from open end of pouch with a bowline knot. See [figure 8-19](#).

17. Attach end of painter line without snaphook to sea anchor mooring patch loop on liferaft with a bowline knot.

18. Dust entire liferaft lightly with talc (MIL-T-50036A).

WARNING

To prevent malfunction during inflation, ensure that no lifeline, sea anchor mooring line, righting line, or retaining line entangles or loops liferaft hardware during folding and packing procedures.

19. Fold liferaft in accordance with [figure 8-20](#). Ensure that sea anchor is placed on top of folded raft and actuating cord extends from folded liferaft.

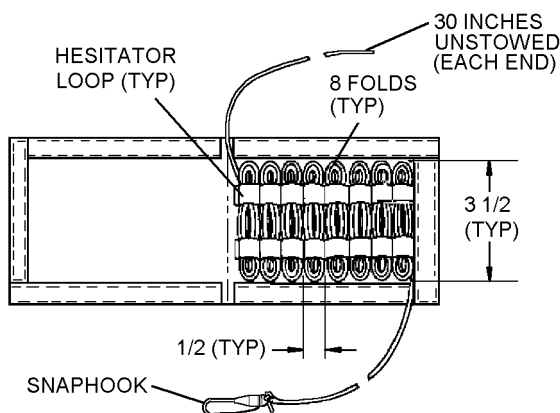


Figure 8-19. Stowed Painter Line

10080019

NOTE

Make a 30-inch center fold when the subject liferaft is packed in a 31-inch carrying case. Make a 35-inch center fold when the subject liferaft is packed in a 36-inch carrying case.

20. Insert rolled liferaft into carrying case so that pull cable housing and attached actuating line are positioned toward carrying case ripcord handle end flap.

21. Stow painter line pouch behind carrying case end flap opposite from ripcord handle end of container; then attach painter line snaphook to end flap carrying handle.

NOTE

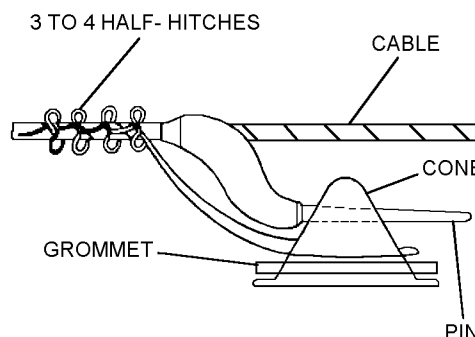
Painter line snaphook shall be attached temporarily to the end flap carrying handle opposite from ripcord end of container. This will provide for easy access to the painter line snaphook for attachment to aircraft.

22. Secure snap/fasteners along length of carrying case.

23. Tie free end of actuating line to ripcord cable loop with a bowline knot. Tack with three turns of waxed size E nylon thread, single. Tie off tacking with a surgeon's knot followed by a square knot. See figure 8-20.

24. Attach retaining line snaphook to end flap carrying handle on ripcord handle end of container. Snap container end closed. See figure 8-20.

25. Install ripcord and safety-tie first and last ripcord pin by passing a 12-inch length of size E nylon thread (V-T-295), single, under ripcord pin. Secure thread to ripcord cable with three or four half-hitches.



H0075025

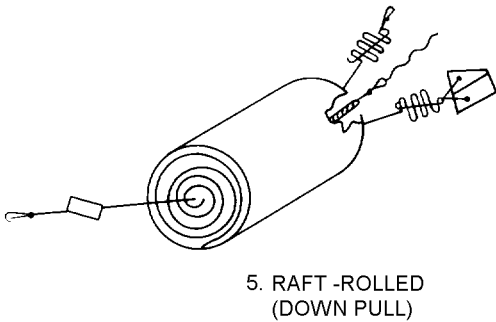
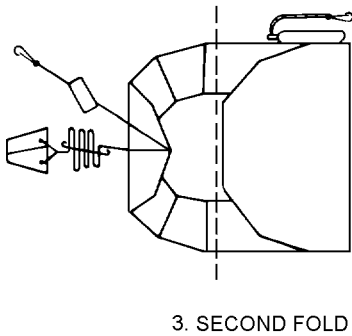
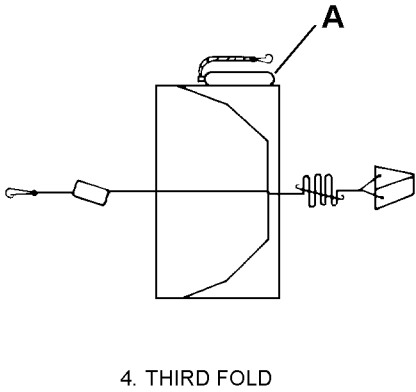
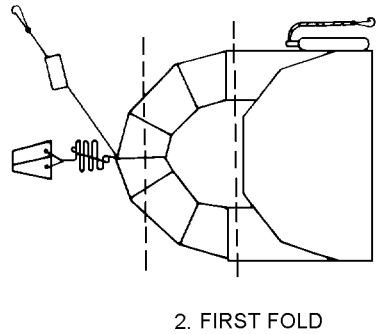
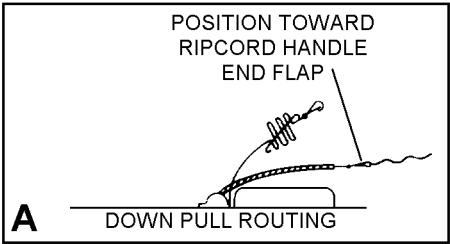
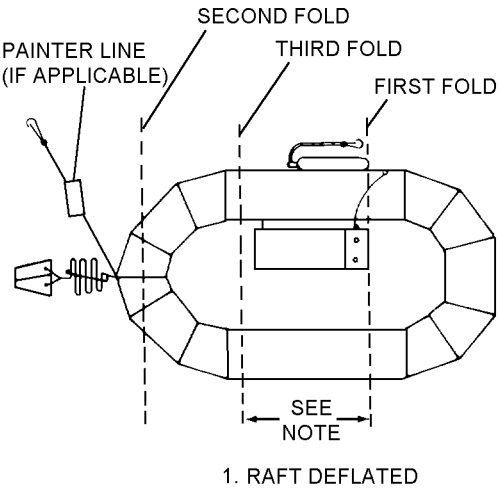
Step 25 - Para 8-75



To prevent pull cable housing breakage, do not stow or store liferaft pack on ripcord handle end of pack.

26. Snap ripcord protector flap closed. Position ripcord handle under carrying case end flap and snap end flap closed. See step 6, figure 8-20.

27. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

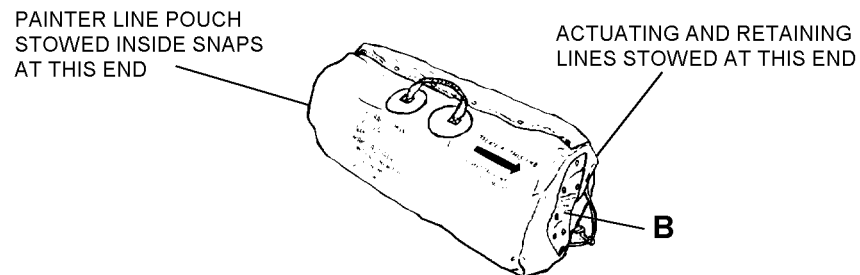


NOTE:

CARRYING CASE	CENTERFOLD
31 INCHES	30 INCHES
36 INCHES	35 INCHES

Figure 8-20. LRU-12/A Folding Procedure - (Droppable) (Sheet 1 of 2)

1008A020



6. RAFT PACKED IN A 36 INCH CARRYING CASE

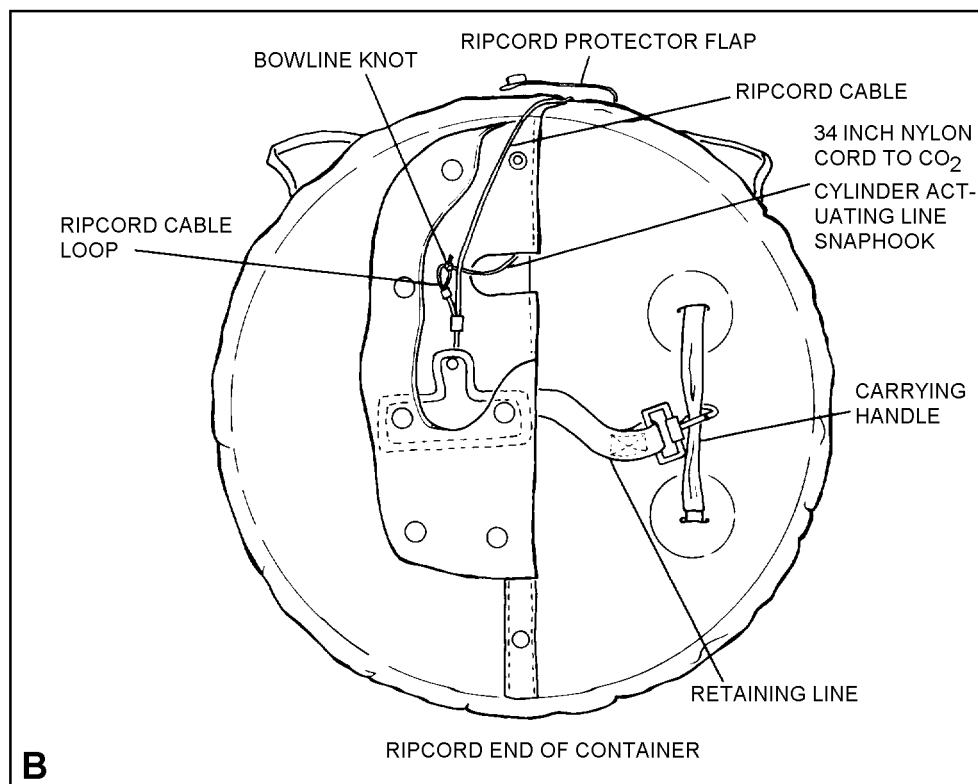


Figure 8-20. LRU-12/A Folding Procedure - (Droppable) (Sheet 2 of 2)

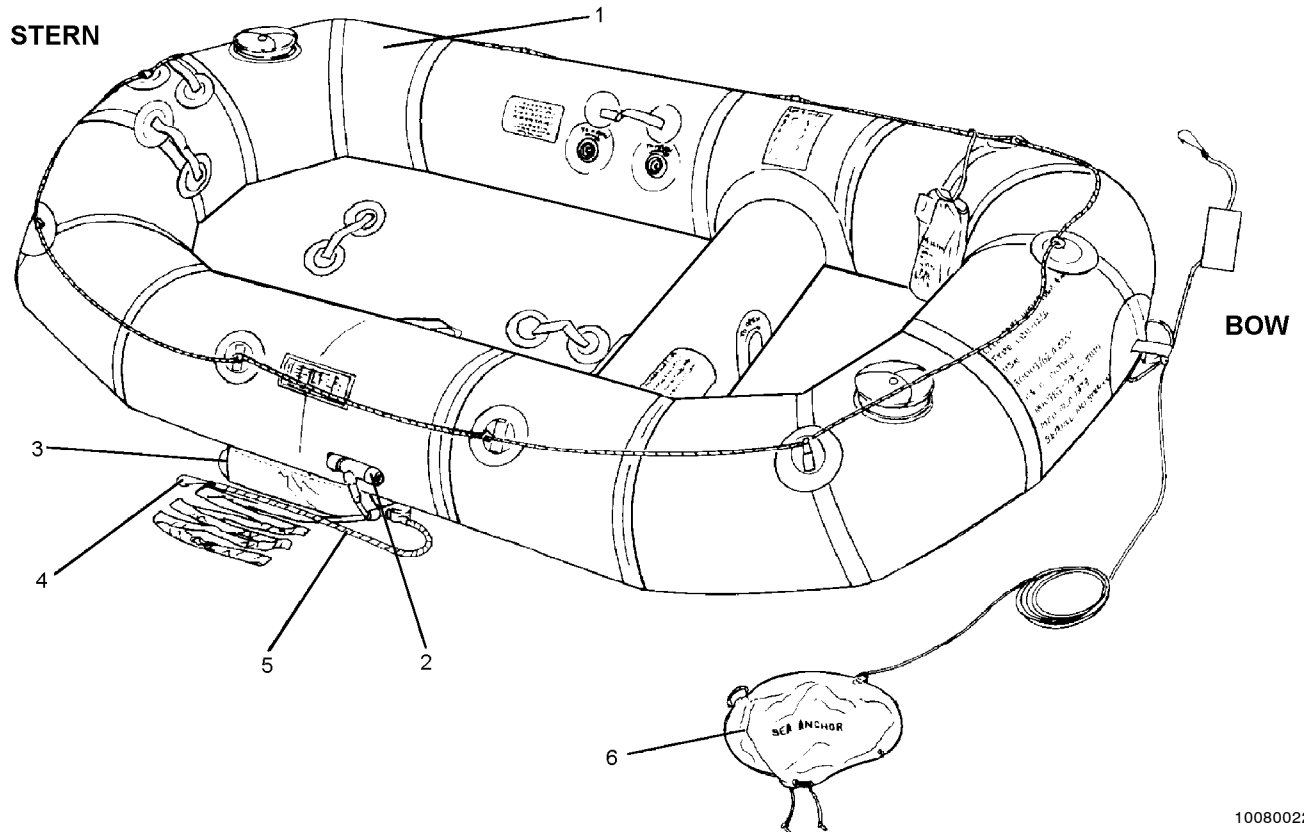
1008B020

Section 8-4. Illustrated Parts Breakdown (IPB)

8-76. GENERAL.

8-77. This section lists and illustrates the assemblies and detail parts of the LRU-12/A Inflatable Four-man Liferaft.

8-78. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.



10080022

Figure 8-21. LRU-12/A Liferaft Illustrated Parts Breakdown

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
8-21		LRU-12/A LIFERAFT ASSEMBLY (Note 5)	REF	
-1	62A82H1-101	. LIFERAFT, Four-Man, Inflatable (Note 1)	1	
-2	63A120H1-71	. . INFLATION VALVE ASSEMBLY (Note 2)	1	
-3	MS26545B2C0147	. . . CO ₂ CYLINDER (Note 2) (Note 3)	1	
	MS26545B4C0147	. . . CO ₂ CYLINDER (Note 2) (Note 3)	1	
-4	1106AS103-1	. . . CABLE ASSEMBLY	1	
-5	1106AS102-1	. . . HOUSING ASSEMBLY	1	
-6	MIL-A-3339	. . SEA ANCHOR, Size 1 (Note 4)	1	
		Notes: 1. The inflatable liferaft P/N 62A82H1-101 comes from supply with a CO ₂ cylinder and inflation valve P/N 63A120H1-13. 2. Item is no longer procured or stocked. Item may be obtained through salvage. 3. The inflation valve and CO ₂ cylinder may be requisitioned as a complete assembly (CAGE 30003) P/N 63A120H1-13, NIIN 00-300-8598. 4. Due to low demand, sea anchors may not be stocked. They may be open purchased from the Patten Co, 1803 Madrid Ave, Lake Worth, FL (561) 588-8500. 5. The LRU-12/A, 4 person raft is being phased out due to low demand. If no assets are available in supply you must order the new 8 person MPLR LRU-30/A, P/N 64490-101. See Chapter 12 for MPLR information.		

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code	Part Number	Figure and Index Number	SM&R Code
MIL-A-3339	8-21-6	PAOZZ	1106AS103-1	8-21-4	PAOZZ
MS26545BC0147	8-21-3	PAGGG	62A82H1-101	8-21-1	PAOGG
MS26545B4C0147	8-21-3		63A120H1-71	8-21-2	XBOZZ
1106AS102-1	8-21-5	PAOZZ			

CHAPTER 9

LRU-13/A (MK-7) LIFERAFT ASSEMBLY

Section 9-1. Description

9-1. GENERAL.

NOTE

New procurements of seven-man liferafts will be designated LRU-13/A. Reference to the designation MK-7 has been deleted throughout this chapter. However, all procedures and requirements referenced in this chapter pertaining to the LRU-13/A also apply to MK-7 liferafts.

9-2. The LRU-13/A is a seven-man inflatable liferaft intended for use by aircrewmembers forced down at sea. It is stowed in a readily accessible area inside the fuselage on all applicable aircraft except the C-2 series. In the C-2 series aircraft it is stowed in the liferaft compartment.

9-3. CONFIGURATION.

9-4. The LRU-13/A liferaft assembly consists of a seven-man inflatable liferaft constructed of polychloroprene-coated cloth and an inflation assembly (CO₂ cylinder with inflation valve). Two internal vertical bulkheads divide the flotation tube into two separate compartments (bow and stern). A noninflatable floor is attached to the main tube and the bottom of the inflatable seat. An inflatable seat is manually inflated through a topping-off valve. A lifeline encircles the flotation tube. A righting line and accessory container securing line are attached to the lifeline. Survival equipment is stowed in the accessory container and in a supply pocket attached to the main tube. A sea anchor is attached to the bow and a boarding stirrup to the stern. There are two topping-off valves on the main tube, two heaving lines, three boarding handles,

and three righting handles on the underside of the floor. See figures 9-1 through 9-4.

NOTE

To make up the packaged assembly complete with accessories and survival items, all required components not supplied with the liferaft assembly must be individually requisitioned.

The following subassemblies have been deleted from newly procured LRU-13/A liferafts; hammock patches, starboard supply pocket, mast holder and socket, oarlock components and emergency equipment container (62A82D8-2). New liferafts shall not be reworked to add subassemblies and older liferafts shall not be reworked to remove subassemblies since their presence is not detrimental to the function of the liferaft.

9-5. APPLICATION.

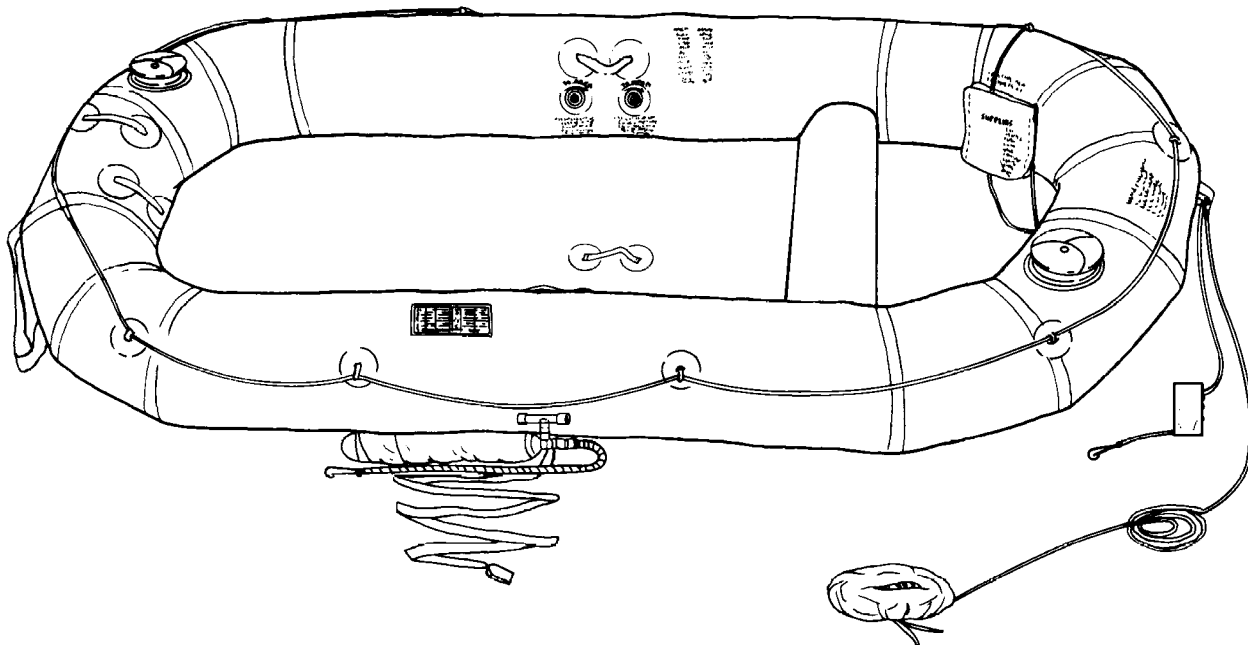
9-6. Multi-place liferafts are authorized for all rotary and fixed wing transport aircraft. Selection shall be based on mission, available storage space, and total number of crew and passengers carried. Additional consideration shall be made for the liferaft inspection cycle. C-130 series (except the C-130J) wing storage is limited to the LRU-15/A in the wing installation configuration. The C-130J wing storage is limited to the LRU-33/A and the Air Cruisers 46-man P/N 63880-103/104. The V-22 is limited to the LRU-34/A and liferafts listed in the current V-22 flight clearance.

Table 9-1. Deleted

9-7. FUNCTION.

9-8. The LRU-13/A liferaft assembly (droppable) is inflated by pulling the inflation assembly ripcord handle, located under the carrying case end flap. The

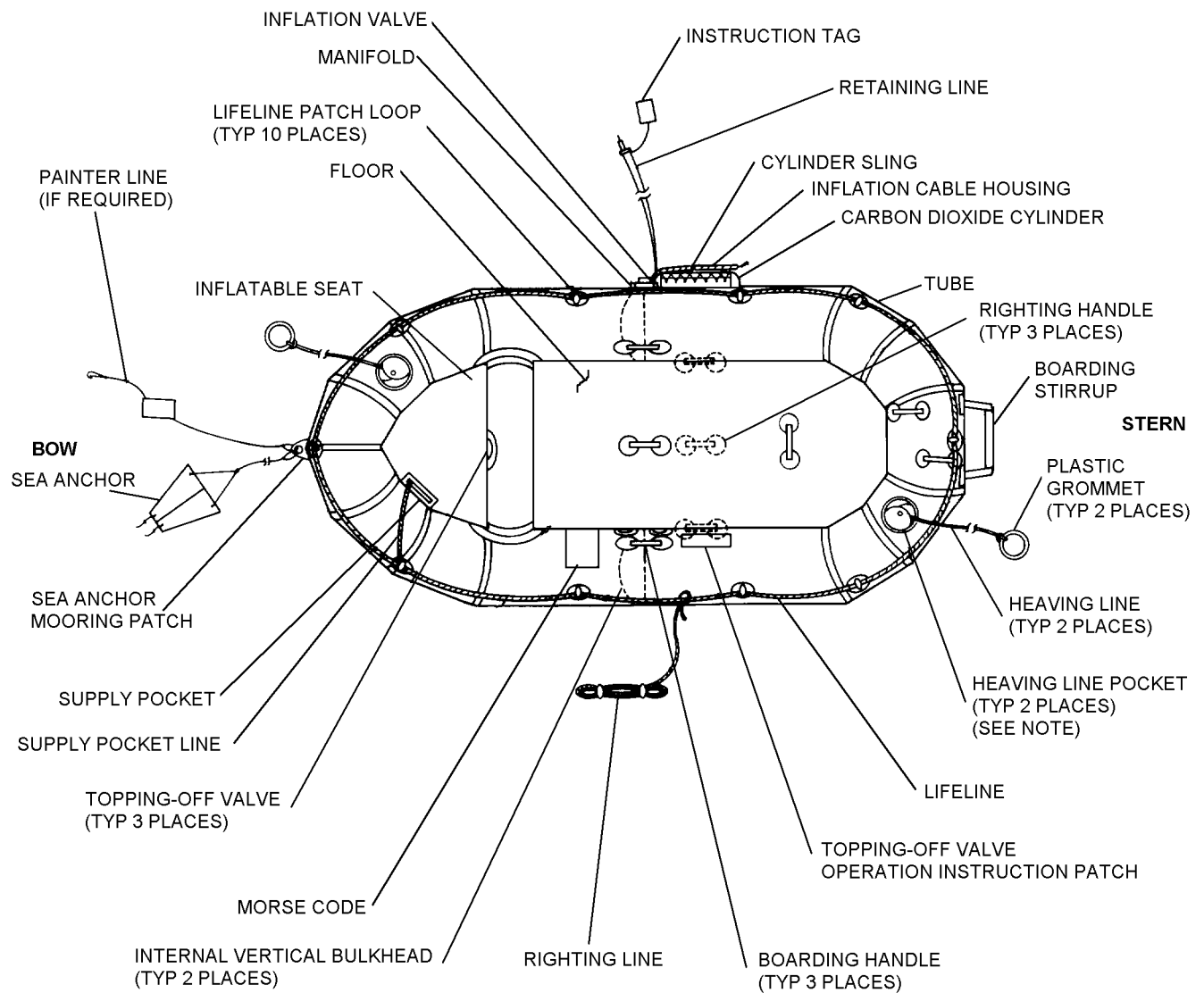
LRU-13/A liferaft assembly (liferaft compartment installation) is automatically inflated and ejected after the liferaft compartment door has been released. After boarding, the seat should be inflated through the topping-off valves with the hand pump provided in the accessory container.



NOTE: NEWLY PROCURED LRU-13/A LIFERAFT ASSEMBLIES WILL BE CONFIGURED WITH HEAVING LINE ASSEMBLIES. EARLIER CONFIGURATIONS WITHOUT HEAVING LINES WILL BE CONSIDERED SERVICEABLE.

Figure 9-1. LRU-13/A Liferaft Assembly

10090001



NOTE: NEWLY PROCURED LRU-13/A LIFERAFT ASSEMBLIES WILL BE CONFIGURED WITH HEAVING LINE ASSEMBLIES. EARLIER CONFIGURATIONS WITHOUT HEAVING LINES WILL BE CONSIDERED SERVICEABLE.

Figure 9-2. LRU-13/A Liferaft Assembly Parts Nomenclature

10090002

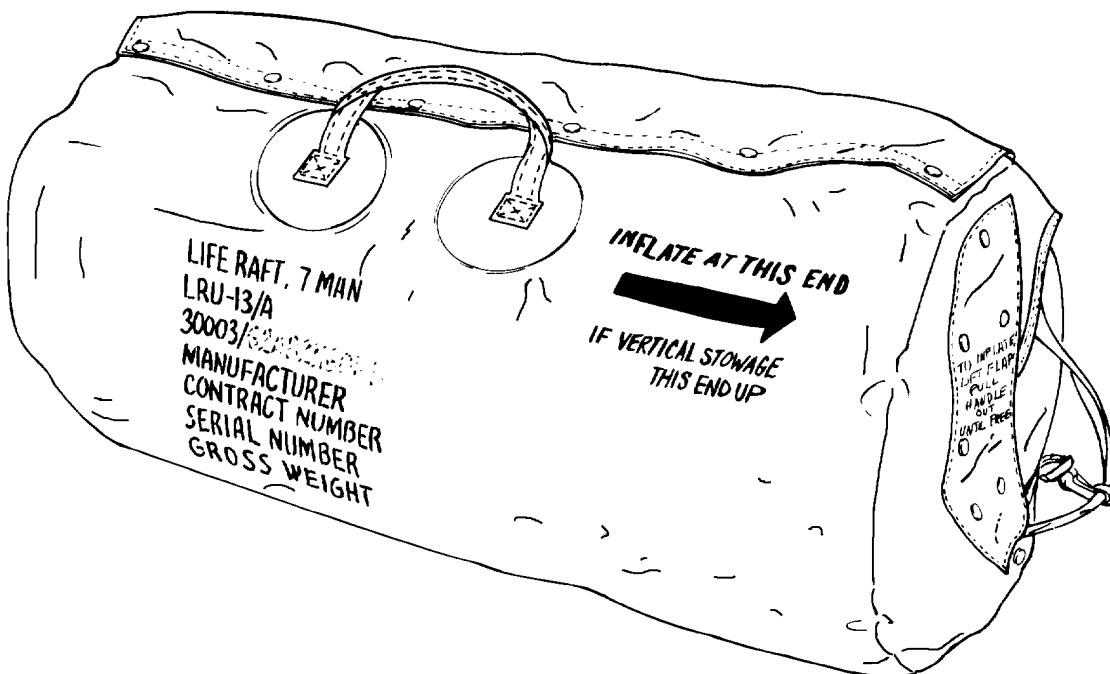
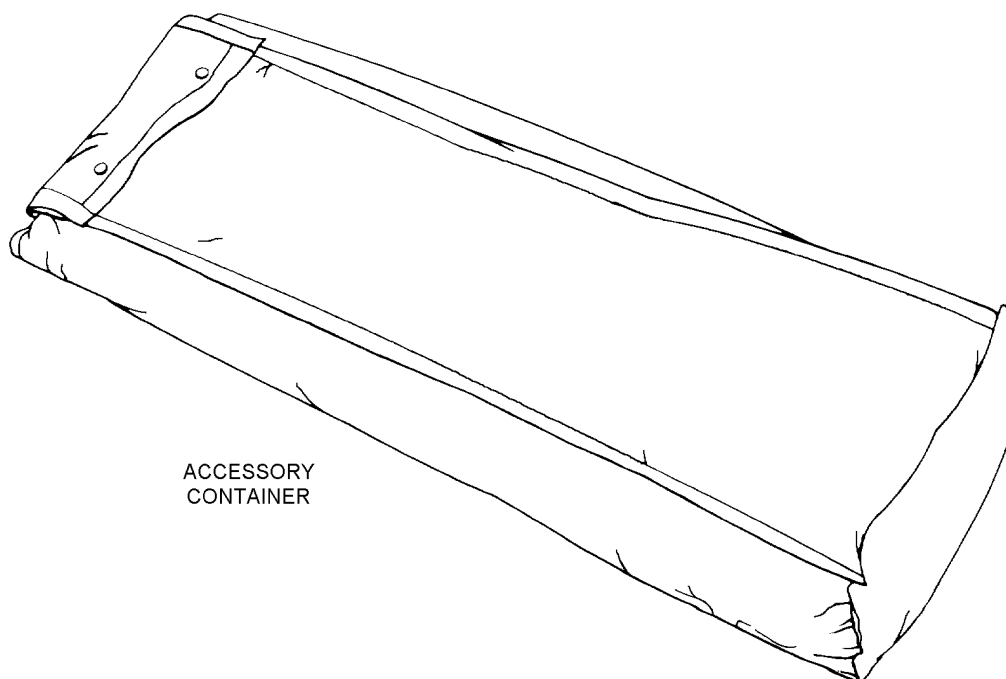


Figure 9-3. LRU-13/A Liferaft Assembly Carrying Case

10090003



ACCESSORY
CONTAINER

Figure 9-4. LRU-13/A Liferaft Assembly Accessory Container

10090004

Section 9-2. Modifications

9-9. GENERAL.

9-10. There are no authorized modifications to the LRU-13/A liferaft assembly at this time. Common

repairs and fabrications to maintain serviceability are listed in table 9-2.

Table 9-2. LRU-13/A Liferaft Common Repairs and Fabrications

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	9-50
Cementing Liferafts	9-51
Patching Liferafts	9-52
Recementing or Replacing Seam Tapes	9-53
Sea Anchor/Mooring Line Replacement	9-54
Addition of International Morse Code Patch	9-56
Relocation of Liferaft Retaining Line Instruction Tag	9-57
Fabrication of Painter Line Pouch	9-58
Drilling Holes in P/N A128-RT-1 Pull Cable Housing	9-59
Drilling Holes in P/N IV0303 (Vee Mfg.) Inflation Valve	9-60
Drilling Holes in P/N A128 Inflation Valve	9-61
Drilling Holes in P/N 971444 Inflation Valve	9-62
Fabrication of Cylinder Valve Antichafing Sleeve	9-63
Fabrication of 10-Foot Retaining Line	9-64
Fabrication of Boarding Handle Assembly	9-65
Fabrication of Boarding Stirrup Assembly	9-66
Fabrication of Righting Lines	9-67
Replacement of Topping-Off Valve	9-68
Repair Procedures for Carrying Case and Handles	9-69
Replacement/Repair of Lifelines	9-70
Replacement of Liferaft Heaving Line	9-71
Replacement of Locking Cones (Liferaft Cases)	9-72

Section 9-3. Maintenance

9-11. GENERAL.

9-12. This section contains information on inspection, disassembly, repair/replacement, testing, and reassembly of the LRU-13/A liferaft.

9-13. INSPECTION.

9-14. All liferaft assemblies shall be subjected to Preflight/Special and Calendar/Phase Inspections.

9-15. The Preflight Inspection shall be performed on fuselage-installed liferafts prior to first flight of the day. This inspection shall be performed by line personnel (plane captain or delegated aircrewmember) who have been designated by the line division officer, instructed and found qualified by the Aviator's Equipment Branch.

9-16. The Special Inspection shall be performed on fuselage-installed liferafts every 30 days. This inspection shall be performed at the organizational level of maintenance by personnel assigned to the Aviator's Equipment Branch. Upon completion, the date of inspection and inspector's signature shall be entered on appropriate form in accordance with OPNAVINST 4790.2 Series.

9-17. All liferafts shall be subjected to the Calendar/Phase Inspection prior to placing in service or, if an aircraft inventory item, at the time of the aircraft Acceptance Inspection. Thereafter, the Calendar/Phase Inspection interval shall coincide with the aircraft inspection cycle in which they are installed, except the helicopter back pack, which shall be inspected every 360 days. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 231. Unless operational requirements demand otherwise, the liferaft Calendar/Phase Inspection shall be performed by intermediate level of maintenance or above.

NOTE

A functional test and pull cable proof load test shall be performed prior to placing in service or during aircraft Acceptance Inspection, and each fourth inspection cycle thereafter. A leakage test shall be performed at each inspection cycle. If inspection indicates damage beyond capability of maintenance, complete applicable forms in accordance with OPNAVINST 4790.2 Series and forward entire assembly to supply. Refer to [paragraph 9-50](#) for determination of repairability.

9-18. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

9-19. PREFLIGHT/SPECIAL INSPECTION (FUSELAGE-INSTALLED LIFERAFTS). To perform a Preflight/Special Inspection, visually inspect for the following:



Do not open liferaft access doors or any sealed or safety-wired/safety tied portion of liferaft for this inspection.

1. Fabric for cuts, tears, deterioration and abrasion.
2. Seams for proper adhesion or stitching.

3. Straps and handles for security and wear.
4. Any other parts for wear, damage and security.
5. All hardware for security of attachment, corrosion, damage, wear, and if applicable, ease of operation.
6. Liferaft retaining line for proper stowage.
7. Liferaft painter line for presence and attachment.
8. Heaving line for proper stowage (if applicable).
9. Ensure that liferaft is properly stowed. Check for bulges caused by trapped air in liferaft.
10. Ripcord pins and cable for bends, fraying, or other damage; ripcord pins for security of attachment to cable.
11. Swaged ball on handle and swaging sleeve on cable for security.

WARNING

Use only authorized safety tie. No tape, wire, or cord shall be employed to secure ripcord pins.

12. Ripcord pins fully inserted into cones, and first and last ripcord pins safety-tied to cones with one turn size E nylon thread (V-T-295), single.

13. Snap fasteners on end flaps and ripcord protector flap securely fastened.

14. If discrepancies are found or suspected, Maintenance Control shall be notified.

9-20. ACCEPTANCE/CALENDAR/PHASE INSPECTION. The Acceptance/Calendar/Phase Inspection consists of the following major tasks (to be performed in the order listed):

1. Container/Case Inspection
2. Functional Test (If Required)
3. Pull Cable Proof Load Test (If Required)
4. Deflation
5. Visual
6. Liferaft Configuration

7. General Inspection
8. Markings Inspection
9. Survival Items and Accessories Inspection
10. Inflation Assembly Inspection
11. Inspection of Inflation Assembly (Charged)
12. Inspection of Inflation Assembly (Discharged)
13. Cylinder Markings
14. Leakage
15. Records Updating
16. Repacking

9-21. PACKED CONTAINER/CASE INSPECTION. To inspect packed containers/cases, examine the following:

1. Fabric for cuts, tears, deterioration, and abrasion.
2. Seams for proper adhesion of stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage, and security.
5. All hardware for security of attachment, corrosion, damage, wear and, if applicable, ease of operation.
6. Container and/or case for stains, dirt, and general condition.

9-22. FUNCTIONAL TEST. To functionally test a liferaft, proceed as follows:

CAUTION

Ensure that there is adequate area free of foreign objects for liferaft inflation.

1. Open liferaft case and unfold liferaft. The functional test shall be performed with the carbon dioxide bottle that was attached during the raft's last inspection. If actuation of the attached bottle will cause it to be non-RFI due to hydrostatic test requirements, and no replacement bottles are available, contact fleet support team for instructions.

2. Actuate inflation assembly.

3. Measure time of inflation; liferaft shall inflate to design shape without evidence of restriction in less than 1 minute.

4. Examine liferaft for obvious damage such as cuts, tears, ruptured seams, and damaged manifold.

5. Determine cause if liferaft does not properly inflate. Remove CO₂ bottle and inflation assembly and inspect inlet valve for cleanliness and embedded foreign matter.

6. If correction is made, repeat [steps 2 through 4](#).

7. Deflate liferaft in accordance with [paragraph 9-24](#). Ensure that all carbon dioxide has been removed.

9-23. PULL CABLE PROOF LOAD TEST. To perform the proof load test, proceed as follows:

NOTE

Perform the Proof Load Test only after the functional test and prior to placing an inflation assembly in service.

1. Remove inflation valve cover plate.
2. Remove pull cable from valve and apply a 50-pound pull force between cable ball and snaphook.
3. Examine pull cable for broken strands of wire, deformed snaphook, security of snaphook spring latch attachment, and loose or cracked swage fittings. If any damage is found, the pull cable shall be discarded and replaced with a new cable. The new cable shall also be tested in accordance with [step 2](#). If snaphook spring latch is loose, it may be repaired in accordance with instructions contained in modification section for the liferaft, or replaced at the discretion of the inspection activity.
4. If pull cable passes this test, reinstall in accordance with [paragraph 9-46](#).

9-24. DEFLATION. To deflate liferaft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Vacuum Unit	61E44688 (CAGE 80049)
As Required	Hose, Rubber, 3/8 or 1/2 inch Inside Diameter	—

1. Attach one end of rubber hose to vacuum pump.
2. Deflation through topping-off valve. Open valve and hold vacuum pump hose over opening in valve. When compartment is collapsed, screw valve closed.

9-25. VISUAL INSPECTION. Prior to visually inspecting a liferaft assembly, the liferaft shall be inflated with air to 1.0 psig.



Remove CO₂ cylinder prior to inflating liferaft with air.

1. Remove CO₂ cylinder from CO₂ cylinder sling.



Ensure that diffuser plug is installed in CO₂ cylinder.

NOTE

If a suitable air source is not available, water pumped nitrogen (FED SPEC BB-N-411) may be substituted.

2. Inflate liferaft with air to 1.0 psig.

9-26. LIFERAFT CONFIGURATION. The liferaft shall be updated by comparing it to the configuration illustrations in [Figures 9-1 through 9-4](#) and [Figure 9-22](#).

9-27. GENERAL INSPECTION. To perform the general inspection, inspect the following:

NOTE

If color, location, or stitching patterns of repaired, replaced, or previously incorporated noncritical items or features (eg, life-raft pockets, handle, ballast bag, sea anchor, etc.) do not exactly conform to instructions, do not remove or rework item or feature if flotation stability or capability and security of attachment are not compromised.

1. Liferaft fabric for cuts, tears, punctures, deterioration and abrasion.
2. Seam tapes for proper adhesion.
3. Seam tapes joining tubes to floors, other tubes or canopy for adhesion and wear.
4. Liferaft floor and canopy for cuts, tears, punctures, and abrasions.
5. All patches for proper adhesion.
6. Pockets for tears, abrasions, and security of attachment.
7. Handles for wear, deterioration, and security of attachment.
8. Sea anchor for wear, tears, and security of attachment.
9. Oral inflation tube, as applicable, for deterioration.
10. Damaged or deteriorated topping-off valves, if applicable, and security of retaining screw.
11. All hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.
12. Liferaft for stains, dirt, and general cleanliness.
13. Any other parts for wear and damage.

9-28. MARKINGS INSPECTION. Compare markings on liferaft and case and/or container to markings shown in [table 9-3](#) and [9-4](#). Restore faded markings.

Install/replace International Morse Code patch as needed: refer to [paragraph 9-56](#). Correct any markings which do not agree with the applicable table. To change markings, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Marking, Laundry, Black	SPE-92 NIIN 00-161-4229
	-or-	
	Ink, Drawing, Waterproof, Yellow	A-A-59291 NIIN 00-634-6583

1. Paint over incorrect marking using waterproof ink (yellow or black as applicable).
2. Add correct marking as close as possible to specified location using waterproof ink.

9-29. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

With the exception of batteries, items reaching overage while packed in survival kits and rafts shall remain in service until the next inspection cycle of the completed assembly.

1. Inventory all accessories and survival items by checking items against [table 9-5](#). Replace missing or unsatisfactory items.

NOTE

NAVAIR 13-1-6.5 contains information inspection/replacement and modification of the survival items.

Ensure URT-33 battery service life does not expire prior to the next scheduled calendar inspection. Refer to NAVAIR 16-30URT33-1 for battery service life. Batteries which exceed service life requirements must be discarded regardless of their condition.

2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

Table 9-3. LRU-13/U Liferaft Markings

Marking	Location	Letter Height
LIFERAFT, INFLATABLE 7-MAN TYPE LRU-13/A USN 30003/62A82H2- [applicable dash number] MANUFACTURER'S IDENTIFICATION CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Tube, starboard side of bow, outboard	1/2 inch
KEEP ACCESSORIES TIED TO RAFT TO AVOID LOSS IN CASE OF CAPSIZING	Tube, port side of bow, inboard	5/8 inch
INFLATION VALVE OPERATION TO INCREASE TUBE PRESSURE 1. SCREW HAND PUMP INTO VALVE CAP 2. ROTATE VALVE CAP 1 1/2 TURNS TO RIGHT 3. PUMP TO INFLATE TO DESIRED PRESSURE 4. ROTATE VALVE CAP 1 1/2 TURNS TO LEFT AND REMOVE PUMP TO DECREASE PRESSURE 1. ROTATE VALVE 1 1/2 TURNS TO THE RIGHT AND BLEED	Under or along side of the topping-off valves on the port liferaft tube inboard and seat tube	3/8 inch 1/4 inch 3/16 inch 1/4 inch 3/16 inch
INTERNATIONAL MORSE CODE [see figure 9-11]	Inboard, port side, aft of seat	1/4 inch
BEFORE INFLATION CLIP SNAPHOOK TO LIFE VEST	On tag attached to webbing retaining line	3/8 inch
TUBE SECTION NUMBERS	Each tube section	1/2 inch
SUPPLIES KNIFE, COMPASS, STEADY BURNING LIGHT, WHISTLE, FLARE GUN, CODE CARD, NYLON CORD, STROBE LIGHT, RADIO	Supply pocket, port side	1/2 inch 1/4 inch
SEA ANCHOR MIL-A-3339B Type I Size 2 MANUFACTURER CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year]	Inside sea anchor	1/4 inch
HEAVING LINE	Stenciled on tube, inboard below assembly	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.		

Table 9-4. LRU-13/A Case and Container Markings


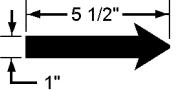
Case/Container	Marking	Location	Letter Height
Carrying Case	LIFERAFT, INFLATABLE, 7 MAN LRU-13/A 30003/62A82H601-1 MANUFACTURERS IDENTIFICATION CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable numbers]	Side panel	1 inch
	INFLATE AT THIS END 	Both sides of case at pull handle end	1 inch 
	1 inch		
	IF VERTICAL STOWAGE THIS END UP	Both sides of case below arrow	1 inch
	INFLATE OTHER END	End panel opposite pull handle end	1 inch
	TO INFLATE, LIFT FLAP, PULL HANDLE OUT UNTIL FREE	Pull handle flap	1/2 inch
Accessory Container	Each accessory container shall be marked with the name of the equipment stored in the container. Refer to table 9-5 .	Front panel	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.			

Table 9-5. LRU-13/A Survival Items

Description	Quantity Required	Reference Number	NIIN	SM&R Code
<u>Packed In Accessory Container</u>				
Desalter Kit, Sea Water, MK2, Type II (Note 10)	4	MIL-D-5531E	00-372-0592	PAOZZ
Sea Dye Marker	4	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal, MK-124 MOD 0 or Signal Kit, MK-189 MOD 0 (Note 9)	6 1	— —	01-030-8330 L564-1370-01-418- 2657	— —
Water Storage Bag (Size A)	3	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Note 12)		—	01-124-4543	PAOZZ
w/ MROD	7			
w/o MROD	18			
First Aid Kit, Size A	1	SC-C-6545-IL Vol. #2	00-922-1200	—
Desalinator, Manual Reverse Osmosis (Notes 1 and 12)	1	—	00-313-6086	—
Sunburn Preventative Preparation	1	MIL-S-37800	01-121-2336	PAOZZ
Food Packet, Liferaft	7	MIL-F-15381	01-028-9406	PAOZZ
Bailing Sponge	1	L-S-626	00-240-2555	PAOZZ
Hand Pump	1	MIL-P-8258	00-097-4580	PAOZZ
Combat Casualty Blanket Type I	1	MIL-B-36964	00-935-6665	PA--Z
Hand Generated Flashlight A-9 (Note 2)	1	MIL-F-8209	00-283-9806	PAOZZ
<u>Packed In Supply Pocket</u>				
Flare Gun, MK-79 MOD 0 (Note 9)	1	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or Signal Light (Strobe) SDU-39/N	1	MIL-L-38217	00-067-5209 01-411-8535	PAOZZ
Light, ChemiLuminescent (Note 11)	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Note 3) or Signal Mirror, Type II	1	MIL-M-18371 MIL-M-18371	00-105-1252 01-455-6695 01-455-6671	PAOZZ PAOZZ PAOZZ
Survival Radio (Notes 4 and 6) and/or Radio Beacon AN/URT-33A (Notes 4 and 8)	As Required As Required	— MIL-B-38401	— 00-160-2136	— PAOGG
Code Card (Note 5)	1	—	—	—
Whistle, Type II	1	MIL-W-1053	00-254-8803	PAOZZ

Table 9-5. LRU-13/A Survival Items (Cont)

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Compass, Pocket, Type MC-1 (Note 7) or Compass, Wrist	1 1	MIL-C-17850 WCC-100	00-515-5637 00-809-5252	PAOZZ PAOZZ
Pocket Knife	1	MIL-K-818C	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	MIL-C-5040	00-240-2154	PAOZZ
<p>Notes: 1. MROD shall be used if RFI assets are available (See Note 2).</p> <p>2. Required for Arctic missions; optional otherwise.</p> <p>3. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted.</p> <p>4. Survival radio or radio beacon requirements shall be in accordance with OPNAVINST 3710.7 series. Following radios apply: Voice-Beacon: AN/PRC-90, AN/PRC-90-2, and AN/PRC-149. Beacon only: AN/URT-33, AN/PRT-5, and AN/PRC-140. The AN/PRC-149 will become the preferred radio when available.</p> <p>5. Refer to NAVAIR 13-1-6.5.</p> <p>6. If PRT-5 transmitters are carried, they shall be packed in the accessory container.</p> <p>7. Use MIL-C-17850 until stock is depleted, then use WCC-100.</p> <p>8. Ensure battery service life does not expire prior to next scheduled special inspection. Refer to the applicable manual for the installed radio for battery service life.</p> <p>9. MK-189 MOD 0 Signal Kit contains 6 MK-124 Day/Night flares and 2 MK-79 MOD 0 flare guns. If MK-189 MOD 0 is used, MK-79 will not be put in supply pocket.</p> <p>10. Authorized for use in Arctic/Antarctic environments.</p> <p>11. Chemical Lights will replace SDU-30. If chemical lights are not available SDU-30 may be used until next repack.</p> <p>12. MROD should not be used where water temperatures are below 36°F.</p>				

3. Operate all items which are not expended in use. Replace as necessary.

9-30. INFLATION ASSEMBLY INSPECTION. Inspect inflation assemblies as follows:

9-31. Inspection of Inflation Assembly (Charged). To inspect a charged inflation assembly, proceed as follows:

WARNING

Gas under pressure. Do not attempt to remove valve from cylinder.

1. Inspect cylinder markings. Re-mark as required in accordance with paragraph 9-33.

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damage or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced, perform pull cable proof load test in accordance with paragraph 9-23.

NOTE

To obtain the correct gross weight of the CO₂ cylinder, subtract weight of the diffuser plug from total weight indicated on scale.

3. Weight inflation assembly. If weight indicated on scale is not the same as the gross weight printed on the cylinder (P/N MS26545B2C205A or P/N MS26545B4C205A) with tolerance specified, or if no gross weight is printed on the cylinder, discharge the cylinder and recharge it to 4.64 to 4.76 lbs in accordance with paragraph 9-45.

NAVAIR 13-1-6.1-1

4. Inspect safety wire to ensure that wire size and type are as specified in paragraph 9-46. If necessary, safety-wire the assembly in accordance with paragraph 9-46.

9-32. Inspection of Inflation Assembly (Discharged). To inspect a discharged inflation assembly, proceed as follows:

1. Inspect cylinder markings. Re-mark as required in accordance with paragraph 9-33.

2. Check date of last hydrostatic test. If greater than 5 years see paragraph 9-42 for disposition.

3. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damaged or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced, perform pull cable proof load test in accordance with paragraph 9-23.

4. Recharge assembly in accordance with paragraph 9-45.

9-33. Cylinder Markings. Markings on all CO₂ inflation cylinders shall be in black letters 1/4 inch high. Information shall include gross weight, tare weight, and weight of CO₂. In addition, multiplace liferaft cylinders shall be marked with the following information in 1-inch red letters: WARNING - COMPRESSED GAS - DO NOT DROP. Paint and stencil cylinder as required. Weight of CO₂ is 4.64 to 4.76 lbs. Ensure that all markings are included as necessary.

9-34. LEAKAGE TEST. To perform a leakage test, proceed as follows:



Liferaft should not be disturbed during leakage test.

9-35. Test Fixtures. As assembled, test fixtures are not stocked in the Supply System; fixtures must be fabricated to meet the requirements of the schematic shown in figure 9-5. A suggested test fixture consisting of a three, way valve, pressure gage, and suitable

adapters for the compartments being tested is shown in Chapter 3.

9-36. Test Procedure. To test liferafts for leakage, using test fixture shown in Chapter 3, proceed as follows:



Ensure that area surrounding liferaft is clear of foreign objects.

If three-way valve is not used, measuring device valve must be closed when air-feed valves are open.

NOTE

If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

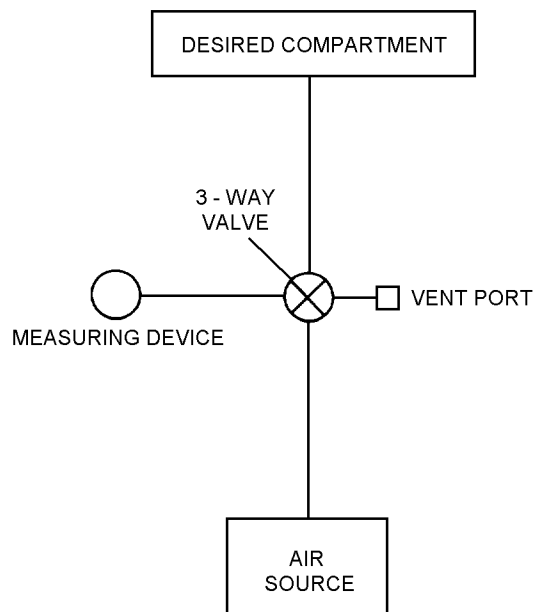


Figure 9-5. Test Fixture Schematic

10090005

Table 9-6. Flotation Compartment Pressures

LRU-13/A Compartment	Leakage Test Pressure (psig)	Minimum Pressure (psig)
Bow Section	2.0	1.60
*Inflatable Seat	1.0	0.60
*Stern Section	2.0	1.60
*Compartments may be tested simultaneously.		

1. Open topping-off valve then thread adapter into topping-off valve threads. Open air supply valve and inflate liferaft. Alternately position valve at measuring device, vent and air supply until proper pressure is attained. Refer to [table 9-6](#).

2. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure shall be readjusted, if necessary, to the leakage test pressure. Refer to [table 9-6](#).

3. Disconnect air supply and check for leaks. Ensure that all valves are closed.

4. Record temperature and barometric pressure and allow raft to remain undisturbed for a minimum of 4 hours.

6. Record temperature and barometric pressure and correct test pressure for any changes in temperature and barometric pressure. Refer to [tables 9-7](#) and [9-8](#).

EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	- 5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057

UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

NOTE

If the raft has been stacked during the 4-hour inspection period remove from stacking and place in a horizontal position on the floor or table in the inspection area and take test pressure reading. In no event shall the pressure in the raft be determined with another raft stacked upon it.

5. At the end of a minimum of 4 hours after the readjustment period in [step 2](#) record test pressure.

NOTE

[Steps 6 through 13](#) shall be performed only after leakage test readings have been recorded.

Step 6 - Para 9-36

10036006

Table 9-7. Temperature Conversion Chart

Temperature Difference (Degree F.)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.248
9	0.279
10	0.310
Rise in temperature: subtract from gage reading. Fall in temperature: add to gage reading.	

Table 9-8. Barometric Pressure Conversion Chart

Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368

Rise in pressure: add to gage reading.
Fall in pressure: subtract from gage reading.

7. If pressure of compartment is below pressure limits in [table 9-6](#), inflate to leakage test pressure and check for leaks, using a soap solution. Mark leaks, rinse with fresh water, and dry with a lint free cloth. Determine repairability in accordance with [paragraph 9-50](#).

8. Apply a small amount of soap solution to manifold, and inspect for leaks. Inspect for damage, excessive wear and corrosion.

9. Apply a small amount of soap solution around topping-off valve and check for leaks.

10. Deflate liferaft in accordance with [paragraph 9-24](#).

11. Attach retaining line to neck of cylinder with a lark's head knot.

12. Install cylinder valve anti-chafing sleeve.

13. Reinstall properly charged inflation assembly.

14. Tighten coupling nut to raft inlet manifold to a torque value of 140 to 150 in-lb.

15. Lace cylinder sling closed and snap cover over lacing where applicable.

9-37. RECORDS UPDATING. Make necessary entries on the appropriate form in accordance with OP-NAVINST 4790.2 Series.

9-38. CLEANING AND SERVICING.

9-39. Cleaning and servicing consists of cleaning the liferaft and containers and/or cases, checking hydrostatic test date on multiplace liferaft CO₂ cylinders, inspecting/replacing poppet assembly, replacing the safety disc and washer on inflation valves, recharging CO₂ cylinders and safety-wiring inflation valves.

9-40. CLEANING OF LIFERAFTS. To clean liferafts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint-Free, Type II	MIL-C-85043 NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Solvents are not to be used in the cleaning of liferafts.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

2. Apply cleaning solution to soiled area with a spray or sponge.

3. Allow solution to remain on the surface for several minutes, then agitate with a soft brush or rag.

4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.

5. Dry liferaft with a lint-free cloth and apply a light coating of talc.

9-41. CLEANING OF CONTAINERS AND/OR CASES. Clean in accordance with [paragraph 9-40](#).

9-42. HYDROSTATIC TEST. Inspect CO₂ cylinders used on multiplace liferafts to determine if the previous hydrostatic test was within the last five years. However, a fully charged cylinder (charged to the cylinder gross weight) is considered serviceable, regardless of the last hydrostatic test date, until discharged. If over five year due date for testing, and cylinder has been discharged, proceed with hydrostatic test:

WARNING

Bottles should be turned in for testing as close to due date as possible. Extending hydrostatic testing by leaving bottle charged may result in corrosion build up on inside of cylinder, which may cause a malfunction during actuation.

WARNING

Wire-wrapped cylinders must have wire-wrapping removed prior to hydrostatic testing; cylinders passing the hydrostatic test must be rewound prior to placing back in service.

Wire-wrapped cylinders must have letter W at end of part number. Cylinders received without the W at end of part number do not require wire-wrapping.

Materials Required

Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
	-or-	
1	Parts Kit, Valve	ASV710 (CAGE 34009) NIIN 00-999-7662

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man life-rafts, have siphon tubes installed.

1. Disconnect the cylinder and valve assembly from the raft. Remove and retain valve for the replacement cylinder.

2. Mark appropriate form "Hydrostatic Test Required" in accordance with OPNAVINST 4790.2 Series and return old cylinder to Supply.

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man liferafts, have siphon tubes installed.

3. Obtain a replacement cylinder. Before installing valve on cylinder, gently tap inverted cylinder with a small piece of wood. If any rust or other contamination falls from cylinder, do not use that cylinder; draw another cylinder and repeat contamination check.

4. Check for installation of siphon tube.

5. Replace stem in inflation assembly valve if necessary.

6. Install a new sealing washer.

7. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.

8. Charge cylinder and reconnect valve and cylinder to liferaft as appropriate.

9-43. INSPECTION/REPLACEMENT OF INFLATION VALVE POPPET ASSEMBLY. If leakage of CO₂ is from valve discharge port, inspect the valve poppet (P/N ASV-601, NSN 4220-00-507-6667) for worn seat as follows:

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve from a charged CO₂ assembly.

Materials Required

Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
	-or-	
1	Parts Kit, Valve	ASV 710 (CAGE 34009) NIIN 00-999-7662
1	Valve Poppet Assembly	P/N ASV-601 NIIN 00-507-6667

1. Remove cylinder from liferaft.
2. Remove valve from cylinder.
3. Disassemble valve ([Figure 9-6](#)) and inspect poppet for worn seat. Replace poppet assembly if necessary.
4. Install a new sealing washer.

5. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.

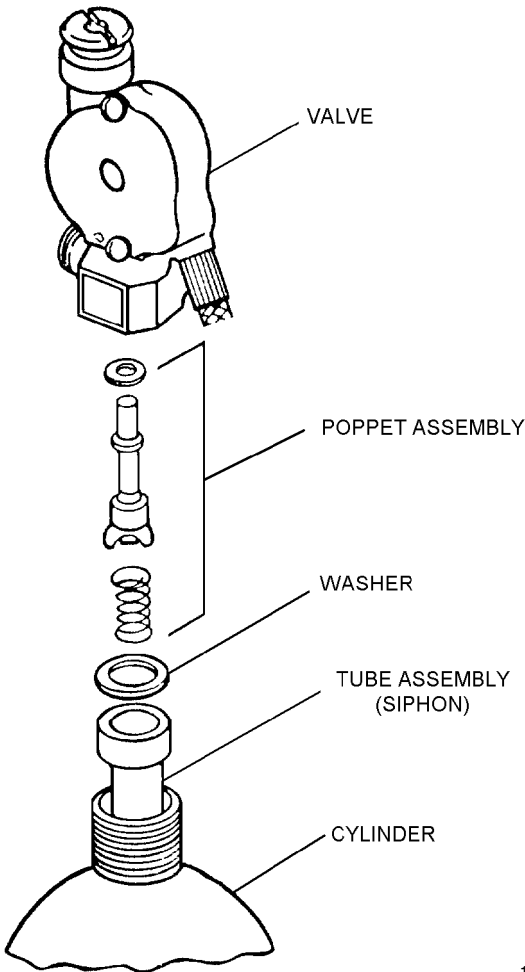
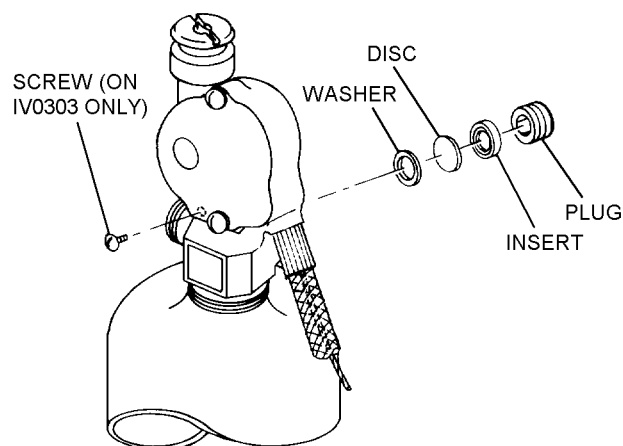


Figure 9-6. Valve Poppet Disassembly

9-44. REPLACEMENT OF SAFETY DISC AND WASHER ON INFLATION VALVES. (See [figure 9-7](#).) To replace safety disc and washer on inflation valve assemblies (A-128/871444 and MIL-V-81722 (FLU-6/P) proceed as follows:

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve or valve safety disc plug from a charged CO₂ assembly.



INFLATION VALVE
P/N A-128, P/N 871444, P/N IV0303

10090007

Figure 9-7. Disassembly of Inflation Valve Safety Disc Assembly

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque	—
1	Socket, 5/16 inch	—

Materials Required

Quantity	Description	Reference Number
1	Repair Kit (Insert, Washer, Disc)	903684 (CAGE 33525) NIIN 00-703-7811
1	Hex Stock, 5/16 x 2 inch Length	—

1. Remove cylinder from liferaft.
2. Remove safety disc plug; insert safety disc and washer.
3. Place new washer into inflation valve safety disc orifice.
4. Place new safety disc into inflation valve safety disc orifice.
5. Replace insert and safety disc plug.

NOTE

While tightening the safety disc plug, align insert with plug.

6. Tighten safety plug on A-128/871444 to 29 ft-lb of torque.

9-45. RECHARGING. To recharge the inflation assembly, proceed as follows (see [figure 9-8](#)):

WARNING

When discharging partially charged or overcharged CO₂ cylinders, hold firmly in place with a suitable holding device (vice). Protect CO₂ cylinder from vice jaws with cloth or a suitable substitute. Position cylinders so escaping gas is not directed toward any personnel.

NOTE

Inspect CO₂ cylinders for multiplace life-rafts before recharging. Refer to [paragraph 9-32](#).

Charged inflation assemblies used as spare replacements shall be inspected in accordance with [paragraph 9-31](#) prior to raft installation.

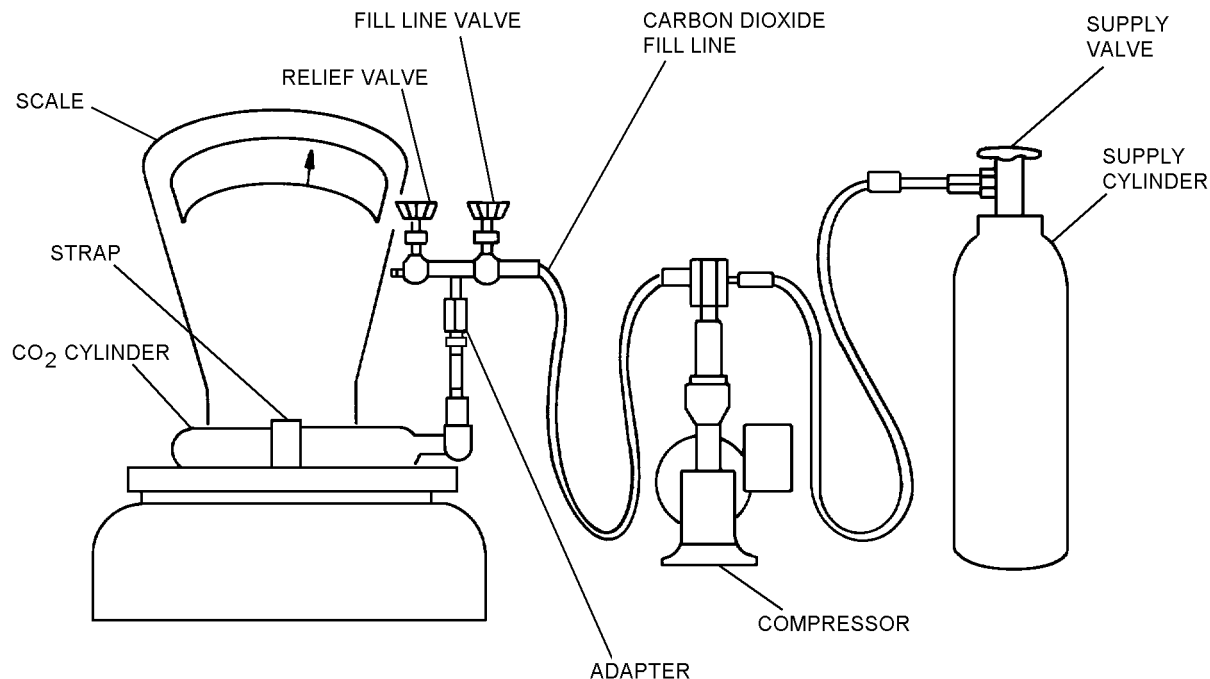
To perform the following filling procedures it is necessary to ensure that CO₂ cylinder is completely discharged.

1. Remove inflation valve cover and rotate cam with screwdriver to open position.
2. Weigh and record tare weight (empty weight cylinder, valve and cable assembly) of inflation assembly. Correct tare weight marking on cylinder if necessary.

NOTE

Supply cylinders not equipped with siphon tube must be inverted during transfer operation. Inverting cylinder allows the liquid to flow from the valve. Supply cylinders with siphon tube (straight pipe) extending from the valve to the bottom of the cylinder can be emptied in the vertical position.

3. Install proper charging adapter on inflation assembly.



NOTE: SUPPLY CYLINDERS NOT EQUIPPED WITH SYPHON TUBE SHALL BE INVERTED USING TILT RACK.

10090008

Figure 9-8. Recharging Schematic

4. Secure inflation assembly to weighing pan.

5. Open supply cylinder valve, fill line valve and relief valve to purge fill line. Close fill line valve and relief valve.

NOTE

Ensure fill line is free from contact with any object along entire distance from compressor to charging adapter. If fill line does not hang free, accurate weight readings cannot be obtained.

6. Connect fill line to inflation assembly and zero scale.

NOTE

Proper charge weight is 4.64 to 4.76 lbs.

7. Ensure inflation assembly valve is open.

8. Open fill line valve.

9. Allow carbon dioxide to cascade from supply cylinder into inflation assembly. If gross weight (tare weight plus 4.64 to 4.76 lbs) cannot be reached, start compressor and complete charging. Stop compressor upon reaching proper gross weight.

10. Close fill line valve.

11. Close inflation assembly valve. Open relief valve on fill line valve if applicable.

12. Disconnect fill line from inflation assembly. Remove charging adapter.

13. Measure gross weight of charged inflation assembly.

14. If gross weight of inflation assembly is greater than required, carefully bleed off excess from inflation assembly. If gross weight is less than required, reinstall charging adapter and repeat [steps 7 through 16](#).

15. Reinstall diffuser plug, if applicable.

NOTE

When other cylinders are to be recharged immediately, leave supply cylinder valve open.

16. Close supply cylinder valve and bleed system pressure.

NOTE

Remove cover plate on multiplace liferaft valve assemblies.

17. Immerse inflation assembly in water tank.

CAUTION

If inflation valve leaks from discharge port, inspect inflation valve poppet assembly in accordance with [paragraph 9-43](#).

18. Check for leaks; then remove assembly from tank and dry with an air blast. Wipe assembly with a lint-free cloth.

NOTE

After storage period, inflation assembly should be checked for proper weight.

19. If required, re-mark tare weight, gross weight, charge weight on cylinder.

20. Safety-wire the assembly in accordance with paragraph 9-46.

9-46. SAFETY-WIRING. To safety-wire the inflation assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Torque Meter	—
1	Special Socket	—
1	Dial Push/Pull Gage	DPPH50 (CAGE 11710) or equivalent NIIN 00-473-0108

WARNING

To ensure that proper safety wire is used on liferaft inflation assemblies, a tensile strength test shall be performed on a sample of wire from each spool intended for this use prior to using.

Materials Required

Quantity	Description	Reference Number
As Required	Wire, Aluminum, 0.032-inch Diameter, Temper 0	QQ-A-225/1 NIIN 00-595-8200
2	Screw, Brass	MS35273-2 NIIN 00-720-8657
2	Washer, Lock	MS35333-10 NIIN 00-011-5551
As Required	Seal, Lead	NIIN 00-598-3427
1	Pin, Steel	—

1. Secure one end of a 12-inch sample of aluminum wire (0.032-inch diameter) to a stationary support.

2. Attach opposite end to pull scale; then apply a pull force.

NOTE

Tensile strength of sample shall be 8 to 15 pounds.

3. Remove valve cover plate and ensure correct routing of pull cable. See [figure 9-9](#).

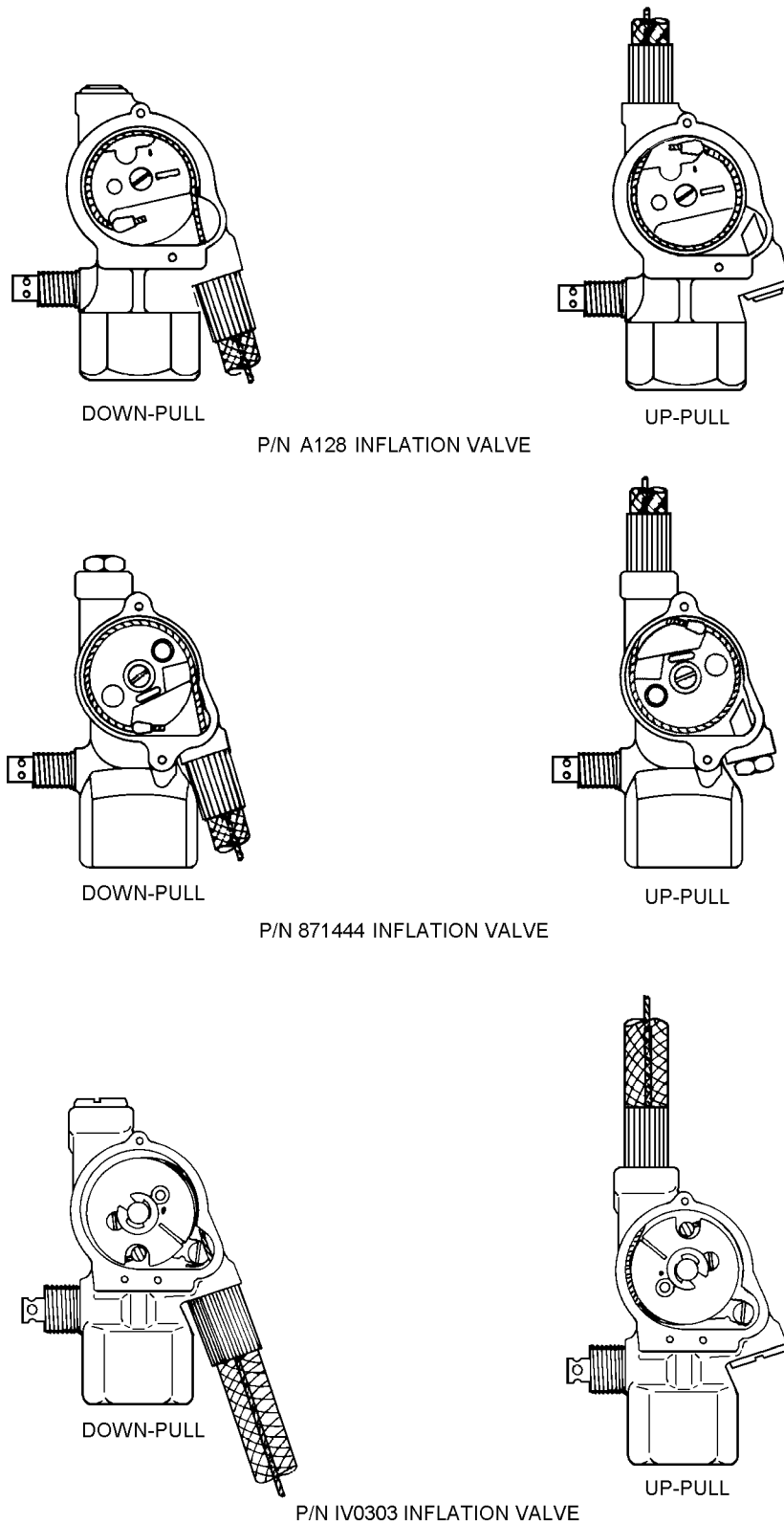


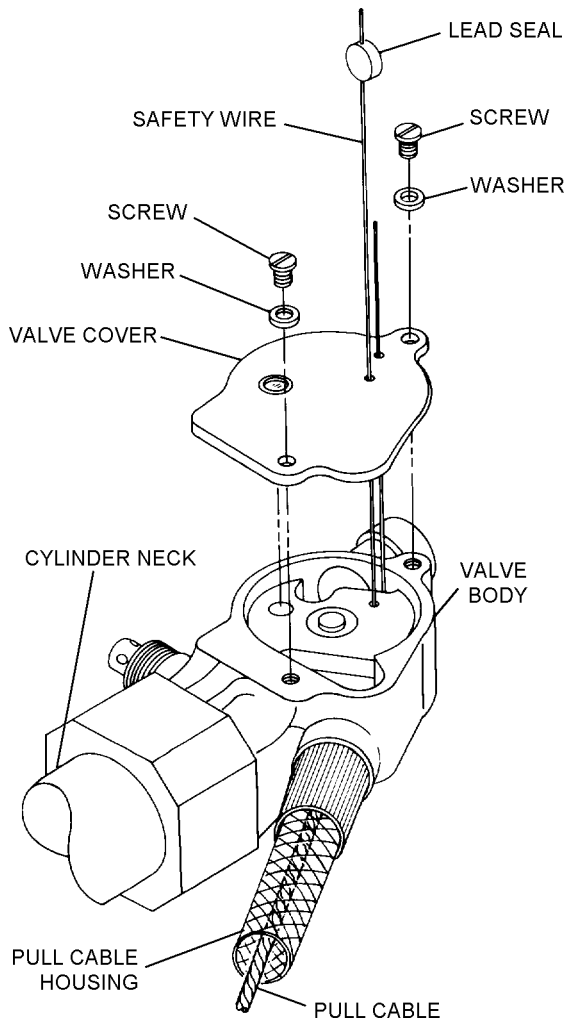
Figure 9-9. Routing of Multiplace Liferaft Pull Cable

10090009

NOTE

Ensure that pull cable has been proof load tested in accordance with [paragraph 9-23](#).

4. Route safety-wire as shown. Use 0.032-inch diameter aluminum wire.



TYPICAL INSTALLATION OF SAFETY WIRE

Step 4 - Para 9-46

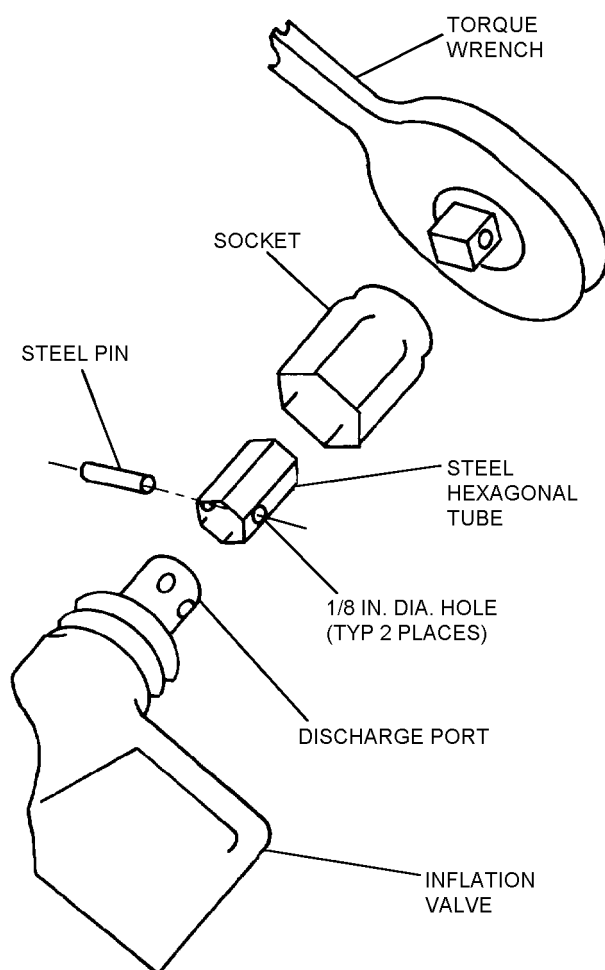
10046004

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5. Replace valve cover. Twist ends of safety wire to achieve maximum tautness and crimp lead seal. Ensure that pull cable is properly installed. Green dot should be visible in valve cover window.

6. Examine inflation valve to ensure the presence of screw and lockwasher.

7. Tighten discharge port to a torque valve of 60 ± 5 in-lb.



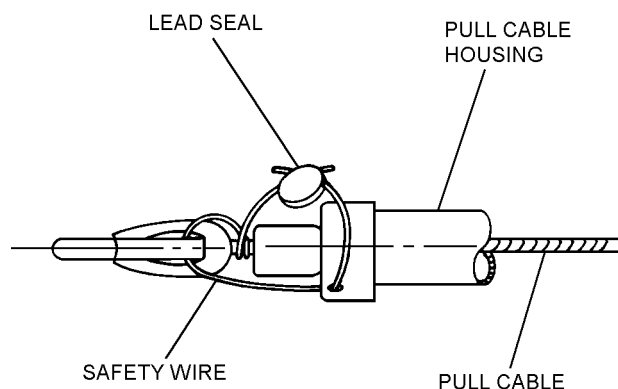
Step 7 - Para 9-46

10046007

NOTE

Multiplace liferafts used in aircraft wing compartments shall be safety-wired according to applicable aircraft maintenance instructions.

8. Safety-wire pull cable to pull cable housing as shown. Use 0.032-inch diameter aluminum wire. Refer to paragraphs 9-59 through 9-62 for pull cable hole location.



TYPICAL REMOTE PULL CABLE SAFETY WIRING

Step 8 - Para 9-46

10046008

9. If inflation assembly is to be stored, attach a red tag with the following instructions printed in ink: **WARNING: WEIGH INFLATION ASSEMBLY BEFORE INSTALLING ON LIFERAFT. DO NOT INSTALL IMPROPERLY CHARGED CYLINDER OR IMPROPERLY SAFETY-WIRED INFLATION VALVE.**

9-47. REPAIR/REPLACEMENT.

9-48. This section contains instructions for the repair or replacement of various components or subassemblies of the LRU-13/A liferaft to ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for minor parts which are defective, corroded or worn and require replacement are included in the applicable paragraph of this section. Otherwise, refer to [Section 9-4](#). All repairs shall be documented by making necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

9-49. Replacement of easily removed assembly components such as CO₂ inflation valves are authorized in addition to repair and replacement procedures documented in this section. The liferaft shall be subjected to

NAVAIR 13-1-6.1-1

a functional and leakage test each time CO₂ inflation valves are removed and replaced for any reason, and each time valve gaskets are replaced.

9-50. DETERMINATION OF REPAIRABILITY. Liferafts shall be considered beyond repair for any of the following reasons:

- 1. Porous fabric areas on tubes.
- 2. Split or open tube seams.
- 3. Leakage test failure resulting from other than cut, tear, or puncture.
- 4. Damaged, malfunctioning, excessively worn, or corroded inlet valve, manifold assembly or oral inflation tube, as applicable.
- 5. Damaged, malfunctioning, or excessively corroded topping-off valve that cannot be corrected by replacement of topping-off valve opening insert and washer.
- 6. Leaky bulkheads.
- 7. Extensively damaged floor.
- 8. Holes or abrasions exceeding 2 inches in length or diameter in pneumatic compartment.
- 9. Deterioration of the rubberized fabric caused by oil, grease, or any other foreign substance.
- 10. Deterioration of the rubberized fabric caused by a heavy mildewed condition.
- 11. Opening of air retaining seams for internal repair.
- 12. Rips, tears, or punctures in the pneumatic compartments which exceed 2 inches.
- 13. In the judgement of a competent inspector, requiring excessive repair.

9-51. CEMENTING LIFERAFTS. All cementing of liferafts shall be performed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620

Materials Required

Quantity	Description	Reference Number
1	Disposable Brush	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone, (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Do not use toluene or MEK near open flames, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Toluene or MEK must be applied vigorously to liferaft material over three years old in order to reactivate the material prior to cementing. Pigment from the material coloring staining a cloth rubbed over the treated surface will indicate the material has been reactivated. Adhesive shall be applied immediately after the surface has dried.



Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-13/A life-raft assemblies.

1. Clean both surfaces to be cemented with four applications of toluene or MEK. Apply toluene or MEK with back-and-forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow areas to dry between applications.

2. Prepare cement and accelerator mixture. Prepare only enough mixture for 8 hours, as this is the effective active period for the mixture. Dispose of any remaining mixture at this time.

3. Using a disposable brush, apply adhesive to completely cover surfaces to be cemented. Use long one-directional strokes and complete each surface before adhesive becomes tacky as the brush may pull tacky adhesive from the surface. Allow to dry for ten minutes.

4. Apply a second coat of adhesive as in [step 3](#). Use brush strokes perpendicular to the original direction.

5. When second coat of adhesive has become tacky, place pieces together. If cemented area is a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden roller.

6. Allow adhesive to cure a minimum of 48 hours.

7. Dust area with talc.

9-52. PATCHING LIFERAFTS. To patch inflatable survival equipment, select color to approximately match item to be patched, and proceed as follows:

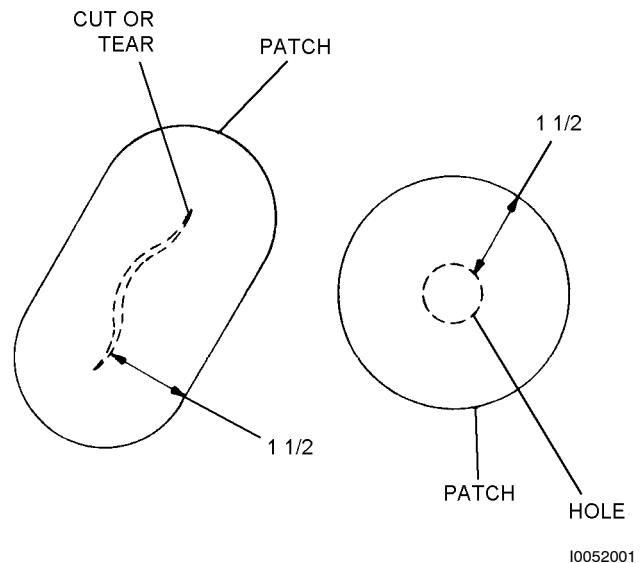
Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
	-or-	
	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489



Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-13/A life-raft assemblies.

1. Cut a rounded patch 1 1/2 inches larger than the damage on all sides.



Step 1 - Para 9-52

2. Scallop edges of patch if it is larger than 5 inches in diameter.

3. If damaged area in floor is larger than 1 inch, patches shall be applied to both sides.

4. Center patch over damage and trace on outline of patch on fabric.

5. Cement patch to damaged area in accordance with [paragraph 9-51](#).

6. Dust area with talc.

7. Perform a leakage test in accordance with [paragraph 9-34](#).

9-53. RECEMENTING OR REPLACING SEAM TAPES. This repair shall be performed only if a flotation tube does not leak, that is, if only the outer seam tape is loose, or if the seam does not seal a flotation tube. To recement or replace a seam tape, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
As Required	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Do not use toluene or MEK near open flame, heat, or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Avoid excessive application of toluene or MEK on seams. Remove any spilled or excessive toluene or MEK immediately.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Seam separation in floors and seats may be repaired provided safety and flotation capabilities are not compromised. Exercise sound judgement in determining whether such repairs are within local capabilities. All cementing shall be performed in accordance with [paragraph 9-51](#).

1. If tape is present and undamaged, recement tape to liferaft.

2. If tape is missing, measure and fit a replacement tape to area and cement in place. Overlap other seams a minimum of 1 inch.

3. If tape is damaged, peel damaged tape from liferaft. Apply toluene or MEK only as needed to loosen tape. Trim damaged tape and replace with new tape. Overlap other seam tape a minimum of 1 inch.

4. Perform leakage test.

9-54. SEA ANCHOR/MOORING LINE REPLACEMENT. To replace worn or damaged sea anchor or mooring line, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
1	Sea Anchor, Type I, Size 2	MIL-A-3339
As Required	Cord, Nylon Type III	MIL-C-5040 NIIN 00-240-2146

1. (Complete Assembly Replacement) Secure free end of mooring line to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

2. (Mooring Line Replacement Only) Sear both ends of a 16-foot length of MIL-C-5040 Type III nylon cord. Secure one end to sea anchor bridle, and other end to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

9-55. INSPECTION RECORD PATCH.

NOTE

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life-rafts. The requirement for all other record documentation remains unchanged. The reason for this change is that most Inspection Record Patches are unreadable, and the packer's and inspector's names, including the type of inspection (leak/functional), are documented on Aviation Crew Systems Records.

9-56. ADDITION OF INTERNATIONAL MORSE CODE PATCH. To fabricate and install an International Morse Code patch, proceed as follows:

1. ~~Letter~~ markings (see [figure 9-11](#)) on uncoated side of patch using black waterproof ink.

Materials Required

Quantity	Description	Reference Number
8 x 5 inches	Cloth, Nylon, Var. C, Rubber-Coated, Orange	MIL-C-23070 NIIN 00-926-6489
As Required	Ink, Black Waterproof	SPE-92 NIIN 00-161-4229

Figure 9-10. Deleted

NOTE

If replacing a worn or abraded International Morse Code patch, a new International Morse Code patch shall be cemented directly on top of old patch.

2. Mark a 8 x 5-inch area at location stated in table 9-3 and shown in figure 9-2.

NOTE

Cement applications shall be performed in accordance with paragraph 9-51.

3. Cement International Morse Code patch to marked area on liferaft so top is “up” and patch is readable from inside of raft.

9-57. RELOCATION OF RETAINING LINE INSTRUCTION TAG. To relocate retaining line instruction tag, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

1. Remove the instruction tag from the snaphook.

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

2. Position instruction tag on retaining line and attach using two rows of stitches.

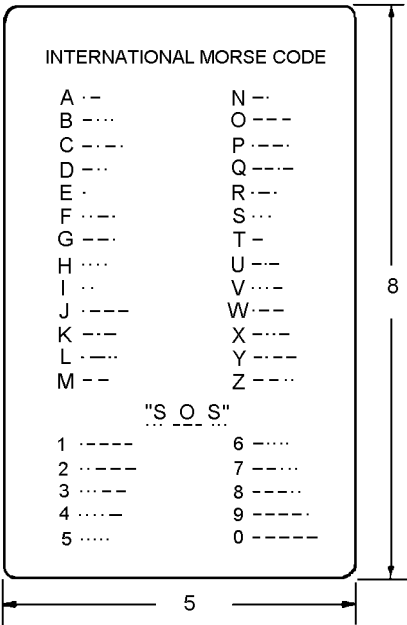
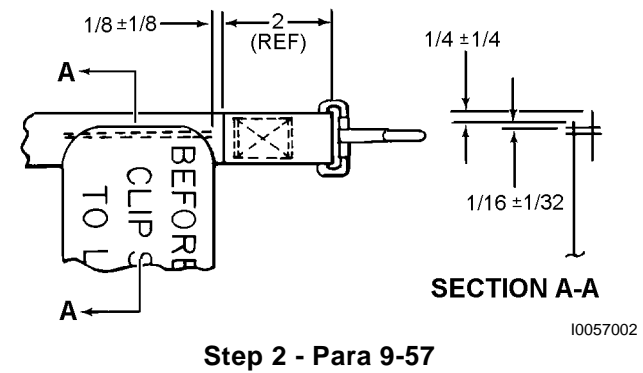


Figure 9-11. Internation Morse Code Patch

10090011

9-58. FABRICATION OF PAINTER LINE POUCH. Painter lines shall be installed on all multi-place liferafts. To fabricate the painter line pouch, proceed as follows:

Materials Required

Quantity	Description	Reference Number
5 x 20 inches	Leatherette, Class 2 or Herculite No. 80, Grey	CCC-A-700
53 inches	Tape, Pile, 3/4-inch	MIL-F-21840
41 inches	Tape, Hook, 3/4-inch	MIL-F-21840
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

Materials Required (Cont)

Quantity	Description	Reference Number
1	Snaphook, Wire Body, Fixed Loop Eye, Flat Spring Closure, With Retainer	MIL-S-43770/1-CWBC1
60 feet	Cord, Nylon, Type I	MIL-C-5040 NIIN 00-240-2154

NOTE

All stitching shall be done with size E nylon thread (V-T-295, Type II), using 8 to 10 stitches per inch.

1. Cut and stitch hook and pile tape along edge of material. See [figure 9-12](#).

2. Stitch two 9-inch lengths of hook tape 1 1/4 inch from sides. See [figure 9-12](#).

NOTE

Stitch pile tape on one end only.

3. Position face up a 15-inch length of pile tape at inner end of each inside strip of hook tape. Secure inner end of each pile tape to material with double row of stitching. See [figure 9-12](#).

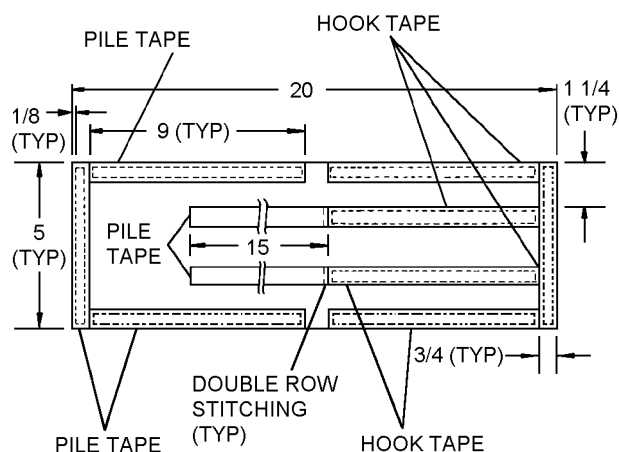
4. Form 1/2-inch wide hesitator loops, 1/8 inch apart. Press hook and pile tape together between loops. See [figure 9-13](#).

5. Stow painter line, making 3 1/2-inch bights, placing 8 folds in each hesitator loop. See [figure 9-13](#).

6. Leave 24 inches of line unstowed at each end for securing painter line to liferaft and aircraft. See [figure 9-13](#).

7. Fold material in half, forming pouch, and leave unstowed ends outside pouch. Press hook and pile tape together.

8. Attach snaphook to one end of unstowed painter line extending from open end of pouch with a bow-line knot.



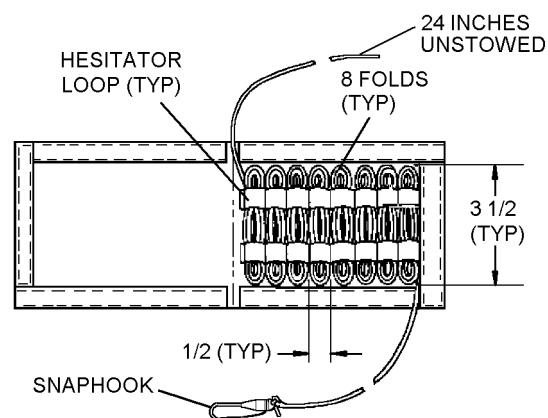
10090012

Figure 9-12. Painter Line Pouch

9-59. DRILLING HOLES IN P/N A128-RT-1. To drill holes in P/N A128-RT-1, proceed as follows:

Support Equipment Required

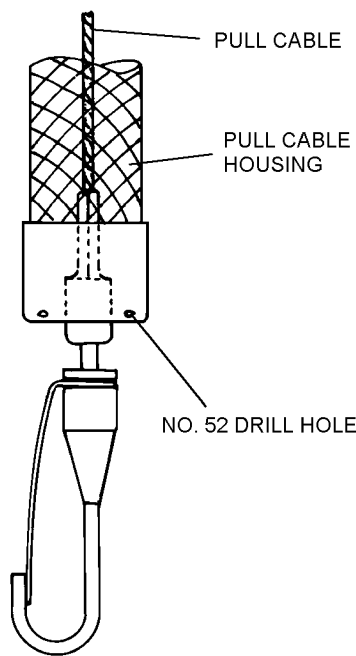
Quantity	Description	Reference Number
1	Drill, No. 52	—



10090013

Figure 9-13. Stowed Painter Line

1. Using a no. 52 drill, drill two holes in pull cable housing.



Step 1 - Para 9-59

I0059001

2. Safety-wire pull cable housing in accordance with [paragraph 9-46](#).

9-60. DRILLING HOLES IN P/N IV0303 (VEE Mfg.) INFLATION VALVE. To drill holes in P/N IV0303 (VEE Mfg.) inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.
2. Remove cover plate and plastic dust shield from valve.
3. Using a no. 52 drill, drill two holes in cover plate and plastic dust shield. See [figure 9-14](#).
4. Remove cam screw from sheave assembly.

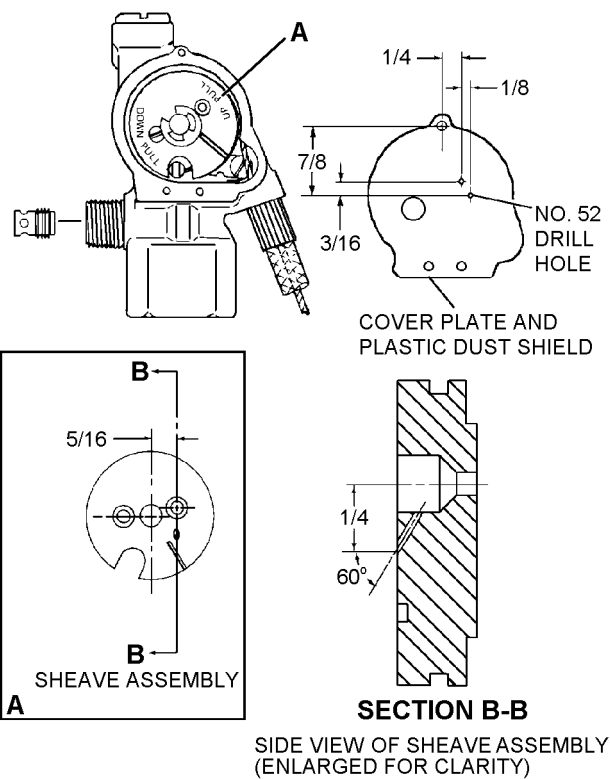


Figure 9-14. Drilling IV0303 Inflation Valve

10090014

WARNING

Care must be taken not to rotate cam.

5. Remove sheave assembly.
6. Carefully remove tru-arc ring from stem on valve body.
7. Remove valve sheave from valve body.
8. Using a no. 52 drill, drill a hole at a 60° angle in valve sheave. See [figure 9-14](#).

NOTE

Section line B-B through the center of the screwdriver slot and the center of the screw hole. A starter hole will be necessary to seat the drill, prior to drilling the angled hole.

CAUTION

Valve cover plate is not interchangeable between manufacturers.

9. Install valve sheave, tru-arc ring, release cable, cam screw, plastic dust shield, and cover plate. See [paragraph 9-46](#) for proper safety-wiring.

10. Connect inflation valve to manifold.

9-61. DRILLING HOLES IN P/N A128 INFLATION VALVE. To drill holes in P/N A128 inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.

2. Remove cover plate from valve.

3. Using a no. 52 drill, drill two holes in cover plate. See [figure 9-15](#).

4. Remove release cable from around valve.

WARNING

Do not rotate cam or depress poppet stem.

5. Remove valve sheave from valve.

6. Using a no. 52 drill, drill a hole at a 23° angle in the valve sheave. See [figure 9-15](#).

7. Install valve sheave, cable, and cover plate. See [paragraph 9-46](#) for proper safety-wiring.

8. Connect the inflation valve to manifold.

9-62. DRILLING HOLES IN P/N 871444 INFLATION VALVE. To drill holes in part number 871444 inflation valve, proceed as follows:

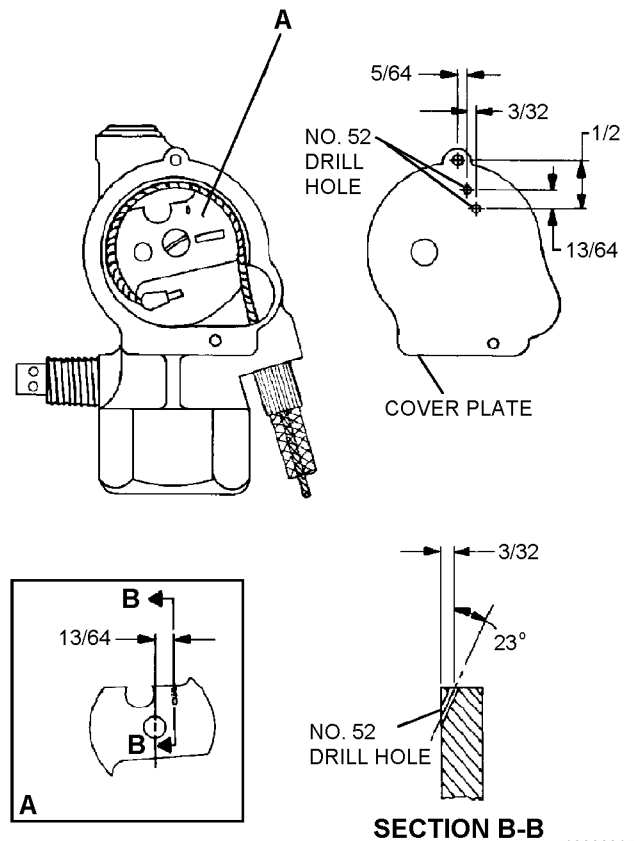


Figure 9-15. Drilling A128 Inflation Valve

10090015

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.

2. Remove cover plate from valve.

NOTE

Position of holes in cover plate depends on type of pull used (up-pull or down-pull).

Position of holes depends on type of pull used (up-pull or down-pull).

3. Using a no. 52 drill, drill two holes in cover plate. See [figure 9-16](#).

4. Remove release cable from around valve sheave.

WARNING

Do not rotate cam or depress poppet stem.

5. Remove valve sheave from valve.

6. Using a no. 52 drill, drill a hole at an 18° angle in valve sheave. See figure 9-16.

7. Install valve sheave, cable and cover plate. See paragraph 9-46 for proper safety-wiring.

8. Connect inflation valve to manifold.

9-63. FABRICATION OF CYLINDER VALVE ANTI-CHAFING SLEEVE. To fabricate a cylinder valve antichafing sleeve, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
16 1/2 x 8 1/2 inches	Cloth, Laminated Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
1	Cloth, Laminated Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489
	Punch, Cutting, Type I, Class B, Style 1, Size 13	GGG-P-833A NIIN 00-180-0927
	-or-	
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

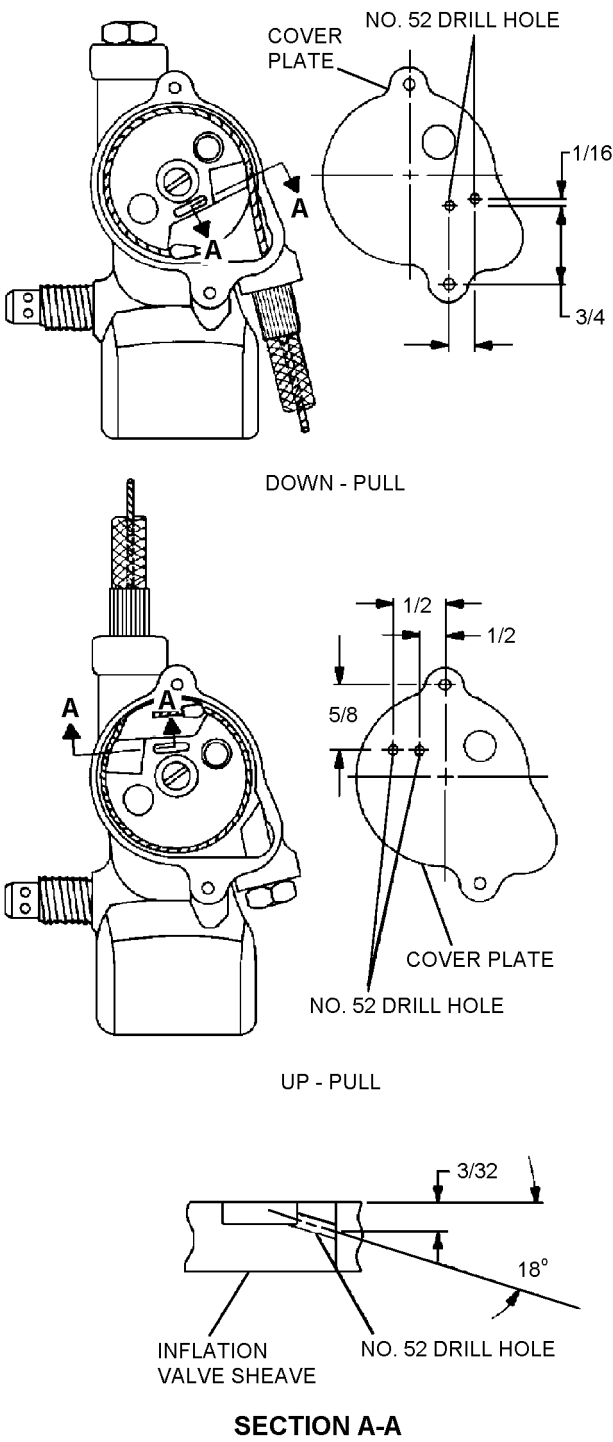
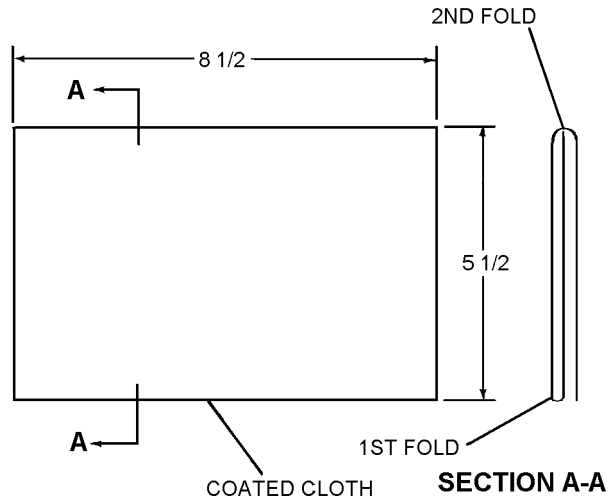


Figure 9-16. Drilling 871444 Inflation Valve

10090016

1. Make two folds in the nylon rubber-coated cloth, each fold being 5 1/2 inches as shown.

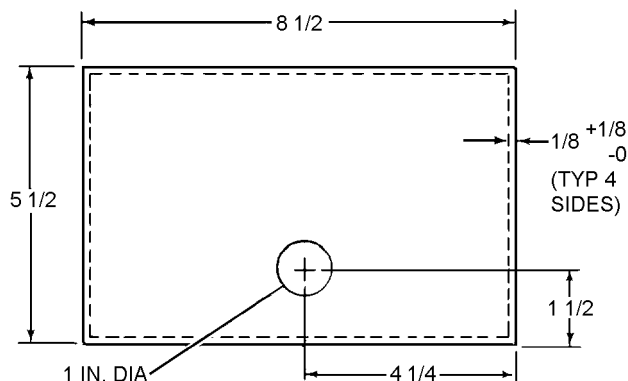


I0063001

Step 1 - Para 9-63

2. Sew a 1/8-inch inboard border row of stitching around the perimeter of the assembly.

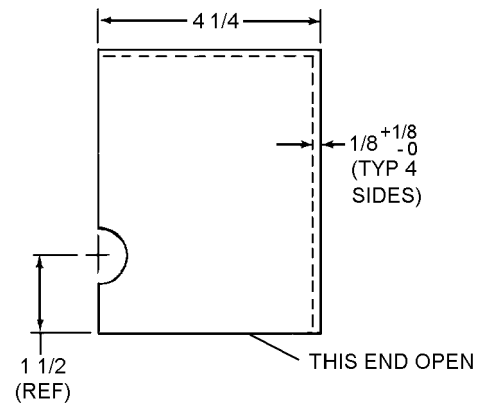
3. Position assembly on cutting board and punch a 1-inch diameter hole through all three layers of material.



I0063003

Step 3 - Para 9-63

4. Fold assembly in half and sew a 1/8-inch row of stitching inboard from edge on end and side.



I0063004

Step 4 - Para 9-63

9-64. FABRICATION OF 10-FOOT RETAINING LINE. To fabricate a 10-foot retaining line, proceed as follows (see [figure 9-17](#)):

Materials Required

Quantity	Description	Reference Number
10 feet 4 1/2 inches	Webbing, Nylon, Type II, 1 inch	MIL-W-4088 NIIN 00-262-1643
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
1	Snaphook	M43770/1-CWBC3

1. Using dimensions shown, pass one end of nylon webbing through snaphook and boxstitch.

2. Using dimensions shown, fold opposite end over and boxstitch, forming a loop.

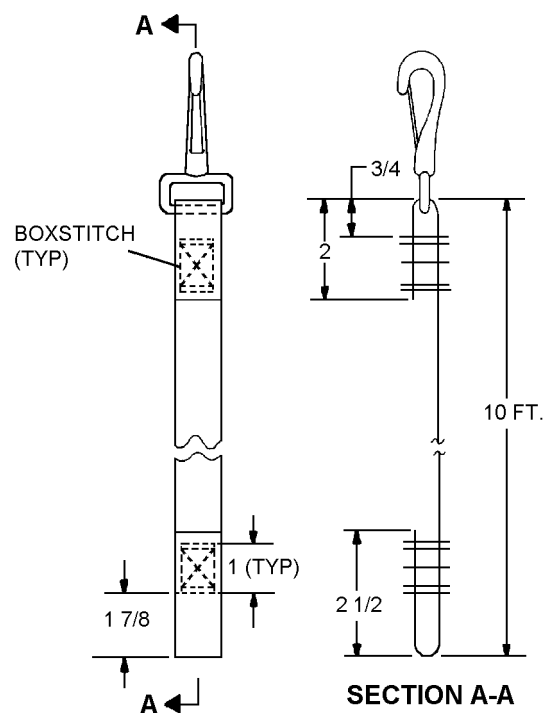


Figure 9-17. 10-Foot Retaining Line

10090017

9-65. FABRICATION OF BOARDING HANDLE ASSEMBLY. To fabricate a boarding handle assembly, proceed as follows:

Materials Required

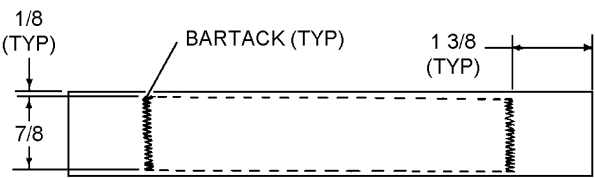
Quantity	Description	Reference Number
As Required	Tape, Nylon, Type II, 1 inch	MIL-T-5038
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

Materials Required (Cont)

Quantity	Description	Reference Number
1	Disposable Brush	NIIN 00-514-2417
As Required	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
-or-	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
-or-	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489

1. Sear-cut two 12-inch pieces of nylon tape for handle.

2. Stitch the two 12-inch lengths of nylon tape together, using 6 to 10 stitches per inch, leaving a space of 1 3/8 inches from each end. Sew in a 7/8-inch bartack 1 3/8 inches from each end.

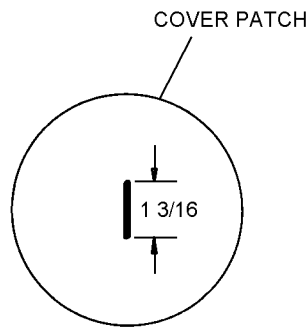


Step 2 - Para 9-65

10065002

3. Cut two 5-inch diameter discs for the cover patch and two 3-inch diameter discs for the base patch from orange nylon liferaft cloth.

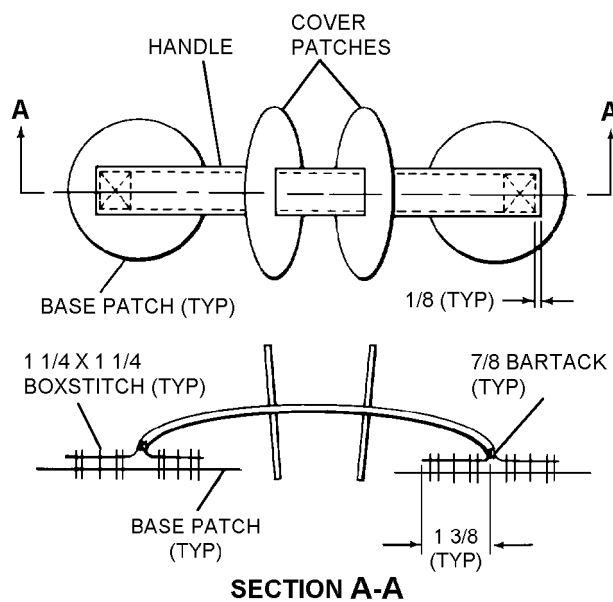
4. On centerline of the two 5 inch diameter cover patches make a slit 1 3/16 inches in length.



Step 4 - Para 9-65

I0065004

5. Insert handle through slit in each cover patch.
6. Separate ends of handle and stitch to each base patch.



Step 6 - Para 9-65

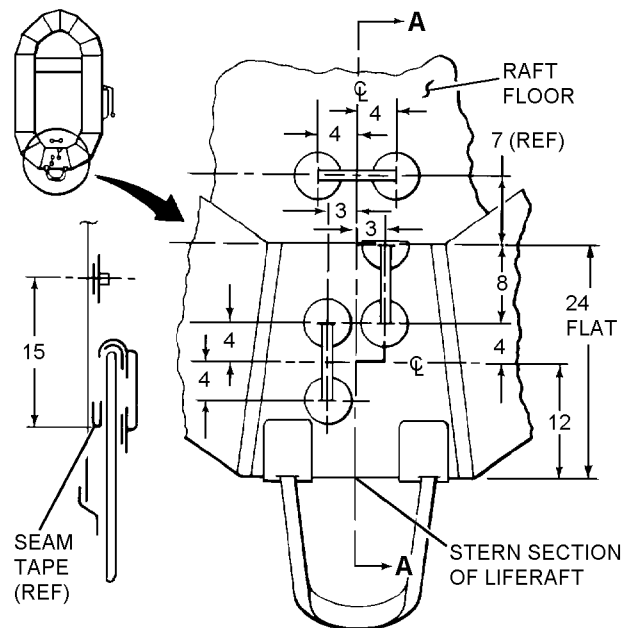
I0065006

NOTE

Cement applications shall be performed accordance with [paragraph 9-51](#).

7. Cement boarding handle cover patches to their respective base patches.

8. Position boarding handle on liferaft and cement in place.



SECTION A-A

Step 8 - Para 9-65

I0065008

9. Dust area with talc.

9-66. FABRICATION OF BOARDING STIRRUP ASSEMBLY. To fabricated boarding stirrup assembly, proceed as follows:

Materials Required

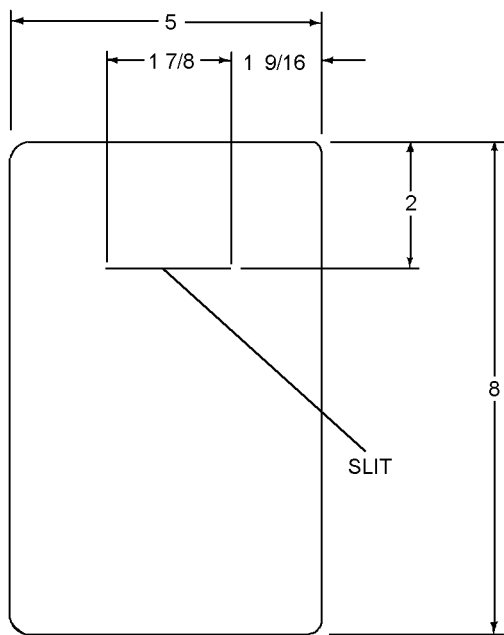
Quantity	Description	Reference Number
As Required	Webbing, Nylon, Type XII, 1 23/32 inches	MIL-W-4088
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

Materials Required (Cont)

Quantity	Description	Reference Number
As Required	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
	-or-	
	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 926-6489

1. Cut two 8 x 5-inch cover patches and two 7 x 4-inch base patches from the orange nylon liferaft cloth.

2. Cut a 1 7/8-inch slit in each of the 8 x 5-inch cover patches.

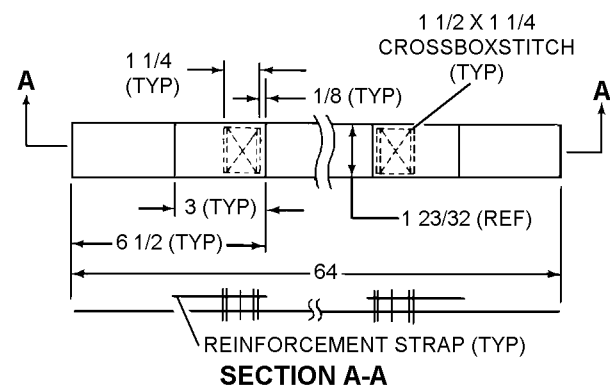


Step 2 - Para 9-66

10066002

3. Sear-cut two 3-inch lengths and one 64-inch length of nylon webbing.

4. Position and stitch 3-inch reinforcement strap to 64-inch boarding stirrup strap with a 1 1/2 x 1 1/4-inch crossboxstitch pattern.



Step 4 - Para 9-66

10066004

5. Slip two 8 x 5-inch cover patches onto boarding stirrup strap and slide them out of the way.

6. Stitch reinforcement strap to 7 x 4-inch base patch with a 1 1/2 x 3/4-inch boxstitch pattern. Stitch boarding stirrup strap to base-patch with a 1 1/2 x 4 3/4-inch crossboxstitch pattern. See [figure 9-18](#).

NOTE

Cement applications shall be performed in accordance with [paragraph 9-51](#).

7. Cement 8 x 5-inch cover patches to their respective base patches.

8. Position boarding stirrup assembly on liferaft and cement in place.

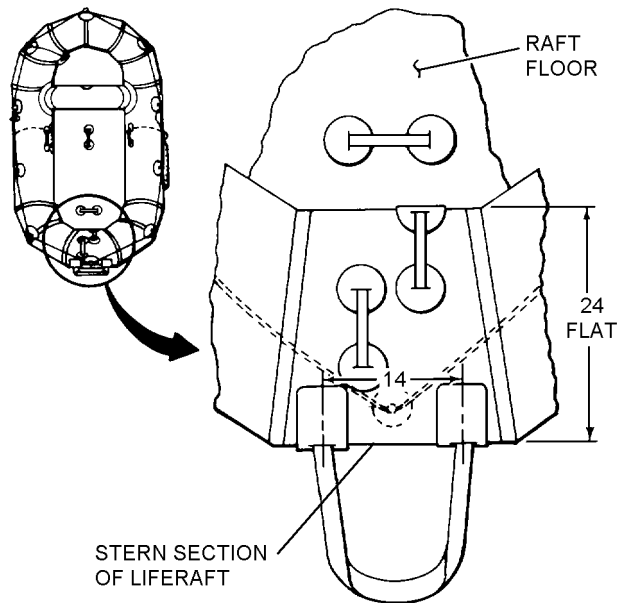
9-67. FABRICATION OF RIGHTING LINE. To fabricate the righting line, proceed as follows:

Materials Required

Quantity	Description	Reference Number
12 feet	Rope, Nylon, Type I, 3/4 inch Circumference, Natural Color	MIL-R-17343 NIIN 00-618-0261

1. Securely tie righting line to liferaft lifeline with a bowline knot on port side opposite manifold (midway between the two lifeline patches). See [figure 9-2](#).

2. Tie two overhand knots, the first knot 1 foot from the free end and the second knot 1 foot from the first. The finished length of the knotted righting line shall be 10 feet 6 inches \pm 6 inches long. To avoid fraying, sear all cut edges. Do not form sharp edges.



Step 8 - Para 9-66

9. Dust area with talc.

10066008

9-68. REPLACEMENT OF TOPPING-OFF VALVE. To replace a damaged or corroded topping-off valve, proceed as follows:

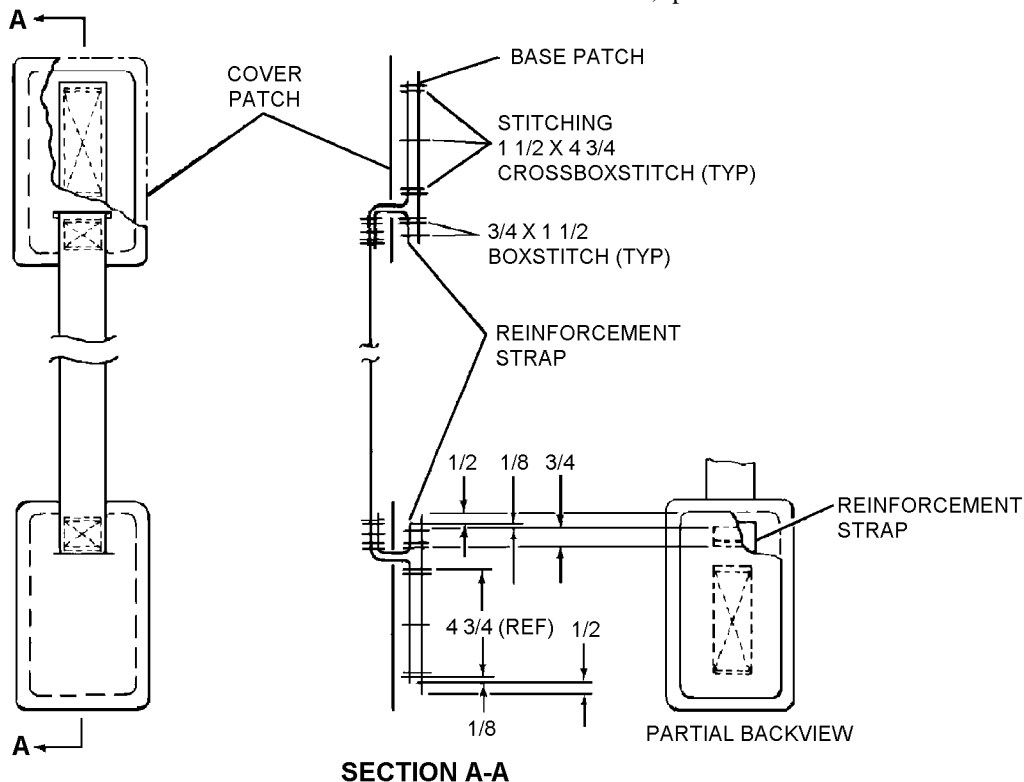


Figure 9-18. Fabrication of Boarding Stirrup Assembly

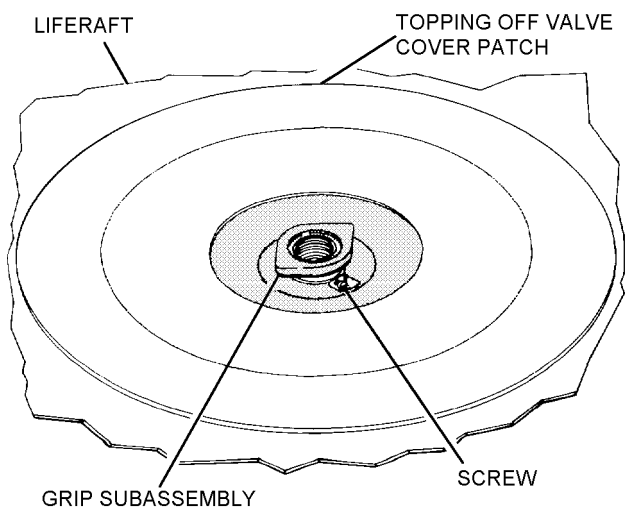
10090018

Materials Required

Quantity	Description	Reference Number
1	Grip Subassembly (See Note)	MS22054-3
1	Washer (See Note)	MS22054-7
1	Screw (See Note)	MS22054-9
As Required	Applicator, Wood, Cotton- tipped	GGA-616D
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913

Note: This component is part of parts kit, P/N 1106AS110-1 (CAGE 30003) NIIN 01-128-5331.

1. Ensure that grip subassembly is in closed position.

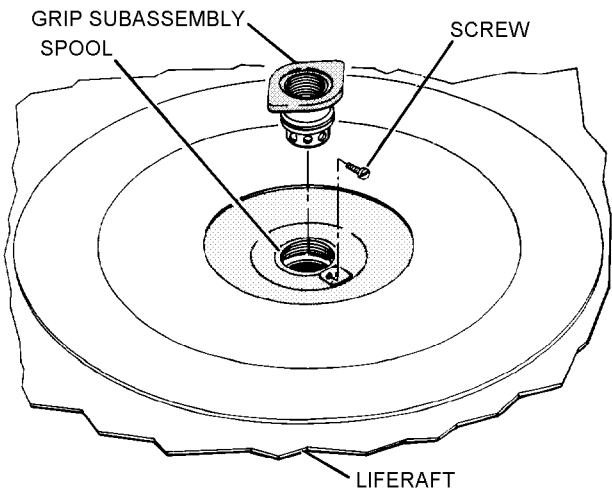


Step 1 - Para 9-68

I0068001

2. Turn grip subassembly clockwise approximately 1 1/2 turns.

3. Remove screw from side of spool.



I0068003

Step 3 - Para 9-68

4. Unscrew and remove grip subassembly from spool.

WARNING

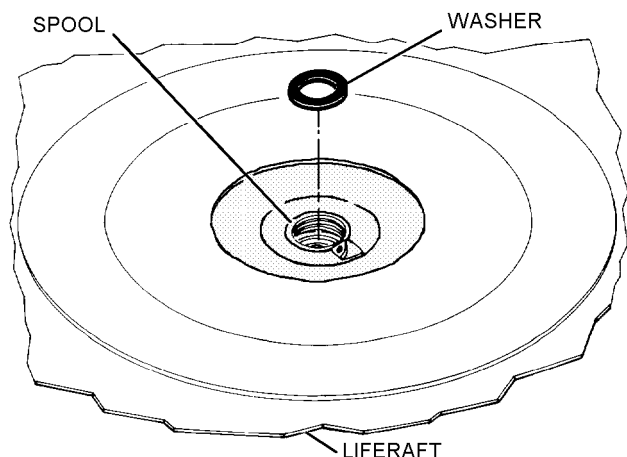
Do not use toluene or MEK near open flame, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.

CAUTION

To avoid damaging valve threads, care should be taken when inserting instrument to remove washer.

Use only enough toluene to loosen washer. Ensure that no toluene or MEK passes through bottom of valve opening. Wipe excess from liferaft as rapidly as possible.

5. Remove washer located in bottom of spool. If necessary, use toluene or MEK to assist in removal.



Step 5 - Para 9-68

I0068005

NOTE

Ensure that no toluene, MEK, or congealed masses of adhesive enter the opening at bottom of spool.

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

6. Insert an applicator or similar instrument dipped in toluene or MEK into spool and swab washer seating area to remove old adhesive.

7. Apply adhesive, using an applicator or similar instrument, to washer seating area on inside bottom of spool.

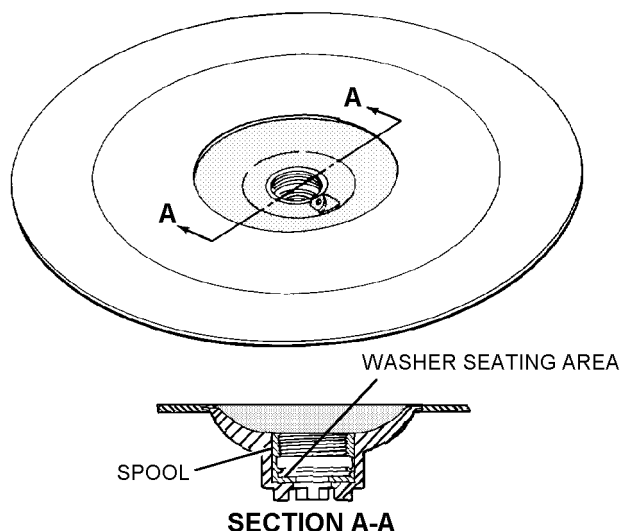


Do not use sharp instrument to insert washer into seating area.

NOTE

Ensure that the washer is properly seated on to bottom of spool and that the threads and opening are free of adhesive.

8. Insert washer into washer seating area.



I0068008

Step 8 - Para 9-68

9. Screw grip subassembly counterclockwise into spool until it closes.

10. Turn grip subassembly clockwise approximately 1 1/2 turns.

11. Tighten screw into side of spool until snug.

12. Ensure proper operation of topping-off valve.

13. Perform leakage test in accordance with [paragraph 9-34](#).

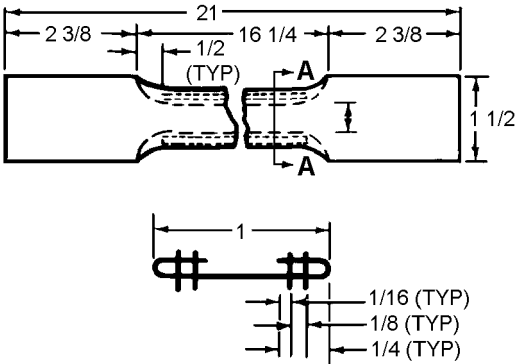
9-69. REPAIR PROCEDURES FOR CARRYING CASE AND HANDLES. To repair the carrying case and case handles, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Webbing, Nylon, Type I, 1 1/2 inches wide	MIL-W-21733 (Optional matl. MIL-W-17337)
As Required	Cloth Laminated Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

1. Handle Repair.

- a. Cut eight 3 1/2-inch diameter circles from laminated cloth (MIL-C-23070).
- b. Stitch cloth circles in place on inner and outer sides of carrying case with centers 14 3/4 inches from outside seam edge and 8 3/4 inches down from top seam edge on right side; 6 1/2 inches down from top seam edge on left side.
- c. Cut two 21-inch lengths of nylon webbing, 1 1/2 inches wide (MIL-W-21733).
- d. On each length, fold 1/4 inch of material under on both sides commencing 2 3/8 inches from end and continuing for 16 1/4 inches. Stitch in place.



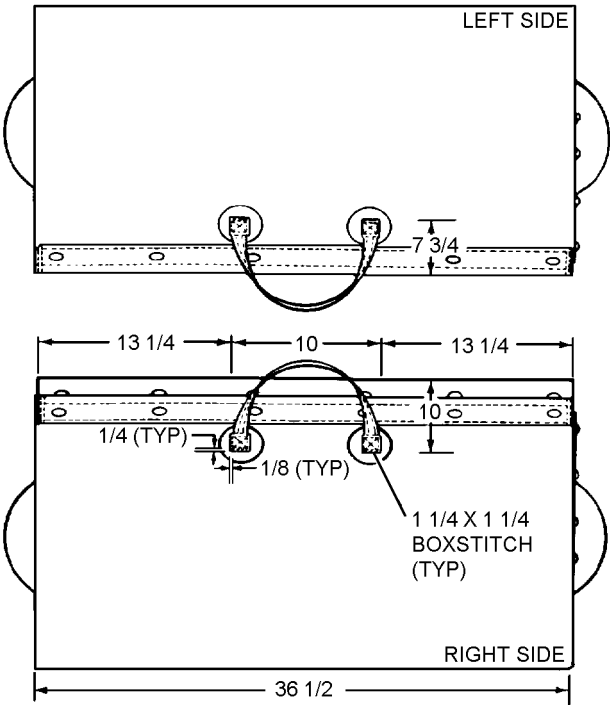
SECTION A-A

Step 1d - Para 9-69

0906901d

- e. Stitch handle ends in vertical position on sides of case on top of reinforcement circles, with

outboard edge of handles 13 1/4 inches from outside seam edge and 10 inches apart; bottom edge of handles 10 inches down from top seam on right side and 7 3/4 inches down from top seam edge on left side. Use 1 1/4 x 1 1/4-inch boxstitch.



0906901e

Step 1e - Para 9-69

2. Carrying Case Repair.

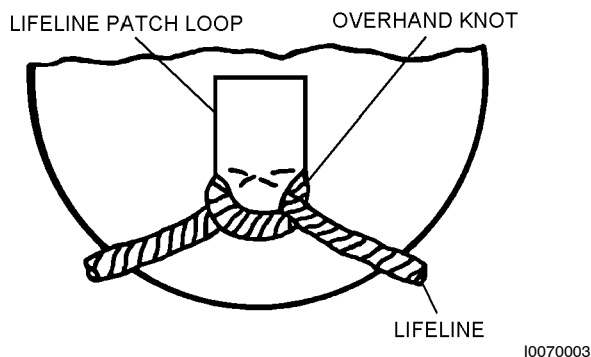
- a. Tears of less than 1 inch shall be darned or repaired with a zigzag stitch.
- b. Tears of 1 to 6 inches shall be covered with a patch.
- c. Broken stitching shall be repaired by over-stitching 2 inches past the ends of the broken stitches and shall be back-stitched one inch.
- d. Tears of over 6 inches shall not be repaired.

9-70. REPLACEMENT/REPAIR OF LIFELINE. To replace or repair the lifeline on the liferaft proceed as follows:

Materials Required

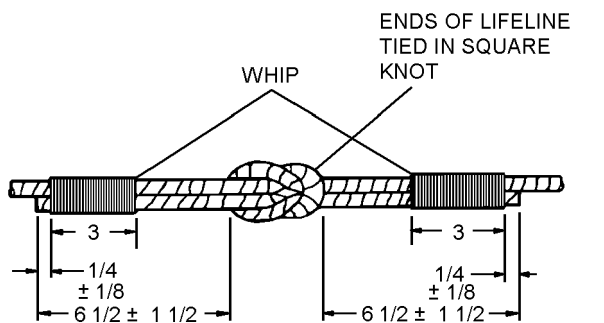
Quantity	Description	Reference Number
As Required	Rope, Nylon, 3/4 inch circumference, Natural Color	MIL-R-17343 NIIN 00-618-0261
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

1. Inflate raft to test pressure.
2. Carefully remove damaged lifeline from all lifeline patch loops (overhand knot) and from righting line (bowline knot).
3. Thread nylon cord through all lifeline patch loops, tying an overhand knot around each loop. Leave 2 inches \pm 1 inch slack in lifeline between each lifeline patch loop.



Step 3 - Para 9-70

4. Secure ends of lifeline with a square knot midway between lifeline patch loops leaving 6 1/2 inches \pm 1 1/2 inches on each end of lifeline outside of knot.
5. Wrap (whip) the last 3 inches of 6 1/2 inch loose ends with Type II size E nylon thread to secured lifeline. A length of 1/4 inch \pm 1/8 inch of bitter end will extend beyond the whip.



Steps 4 and 5 - Para 9-70

6. Secure righting line to lifeline with bowline knot (Refer to [paragraph 9-67](#)).

9-71. REPLACEMENT OF LIFERAFT HEAVING LINE.

To replace liferaft heaving line proceed as follows:

Materials Required

Quantity	Description	Reference Number
75 feet	Cord, Nylon, Coreless Type I, 400 lb Test	MIL-C-7515

1. If required, untie bowline knot and remove defective heaving line from attachment loop in heaving line pocket on main tube of liferaft.
2. Using bowline knot secure one end of replacement line to attachment loop in heaving line pocket.
3. Secure heaving line grommet to opposite end of heaving line using bowline knot.
4. Fake heaving line on flat surface using into 13-inch bights. Gather the line and place rubberband around each end one to two inches from end of bights.
5. Place heaving line in heaving line pocket under grommet. Close pocket and secure snaps.

9-72. REPLACEMENT OF LOCKING CONES (LIFERAFT CASES).

To replace damaged locking cones on liferaft cases, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nylon 3-Cord	V-T-295
As Required	Cone, Locking	NIIN 00-095-0075-LX

1. Cut and remove tacking holding damaged cone to life raft case. Remove damaged cone.

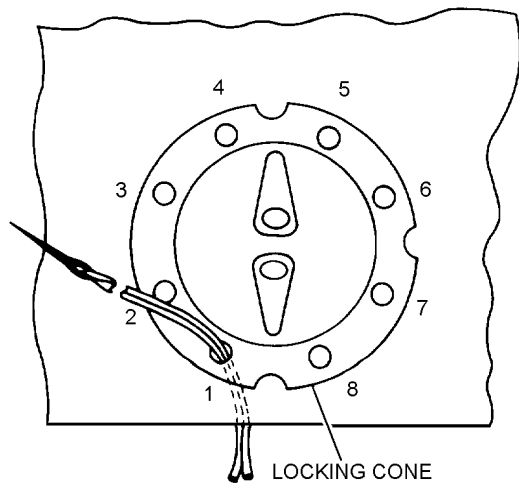
NOTE

If fabric supporting locking cone is damaged, fabricate and install a reinforcing patch on inside of case.

2. Position new locking cone in exact location of damaged or missing cone. Ensure locking pin hole in apex of cone is properly aligned.

NAVAIR 13-1-6.1-1

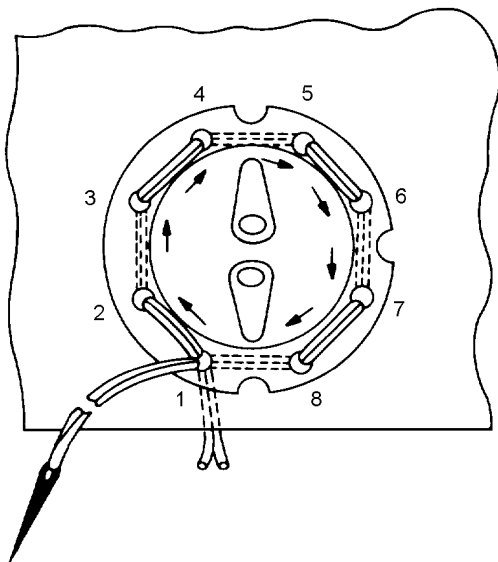
3. Push needle, threaded with waxed nylon 3-cord (V-T-295) doubled, up through panel and through hole 1 in locking cone. Pull needle and thread through hole until approximately three inches of thread remains on underside of panel.



I0072003

Step 3 - Para 9-72

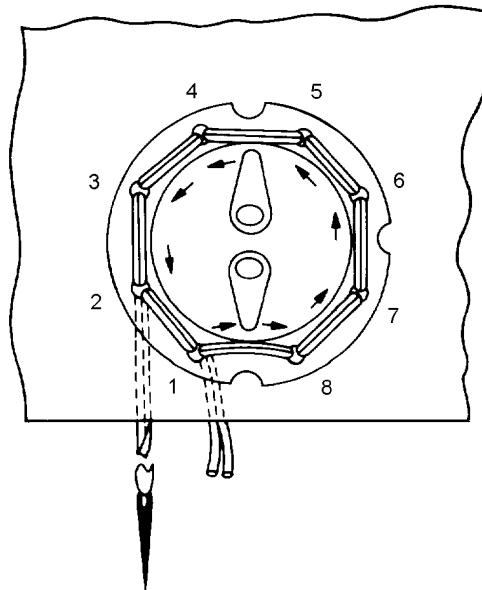
4. Working clockwise, pass needle down through hole 2, up through hole 3. Continue until all holes are threaded, and needle passes up through hole 1. Take up all slack in thread.



I0072004

Step 4 - Para 9-72

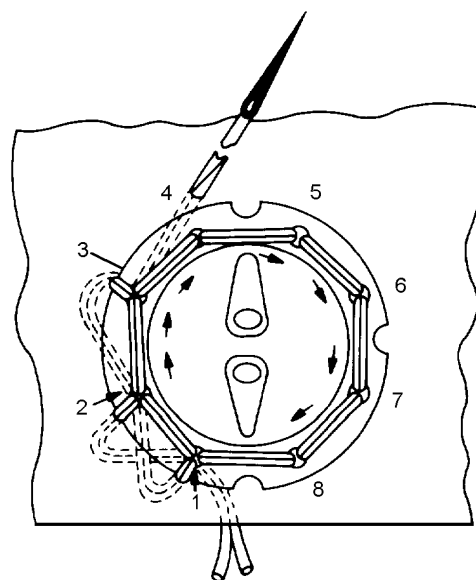
5. Working counterclockwise, pass needle down through hole 8, up through hole 7. Continue until needle passes down through hole 2. Take up all slack in thread.



I0072005

Step 5 - Para 9-72

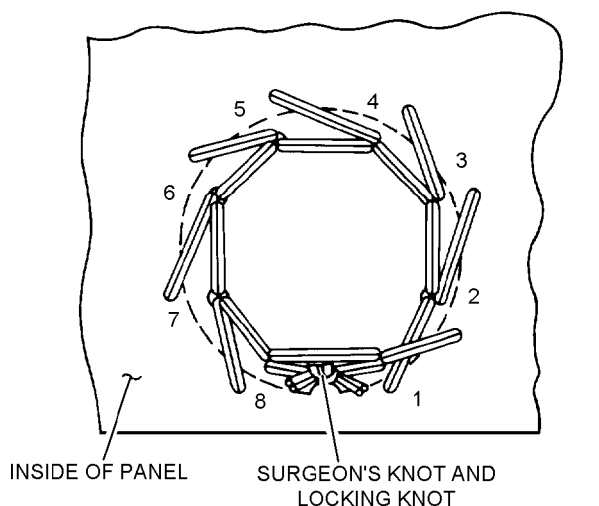
6. Pass needle up through panel at outside edge of cone directly adjacent to hole 1. Working clockwise, pass needle down through hole 1 and up through panel adjacent to hole 2, then down through hole 2. Continue stitching in this manner until needle passes down through hole 8. Take up all slack in thread.



I0072006

Step 6 - Para 9-72

7. Tie ends of thread on inside of panel with surgeon's knot followed by a square knot. Trim thread ends 1/4 inch from knot.



Step 7 - Para 9-72

10072007

9-73. PACKING LRU-13/A LIFERAFT.

9-74. The LRU-13/A liferaft assembly may be packed in droppable configurations (hand-launched) for down-pull or installation into aircraft nacelle or fuselage liferaft compartments. The method used depends upon aircraft application. The LRU-13/A shall be packed by qualified personnel at the lowest level of maintenance possible. Cleaning and servicing instructions can be found in [paragraph 9-38](#).

9-75. PACKING PROCEDURE FOR LRU-13/A LIFE-RAFT (DROPPABLE). To pack an LRU-13/A liferaft assembly (droppable, hand-launched), proceed as follows:

1. Ensure that liferaft, carrying case, and accessory container have been inspected in accordance with [paragraph 9-13](#).

2. Ensure that survival items and liferaft accessories have been inspected for expiration and damage. Refer to [table 9-5](#) for items used.

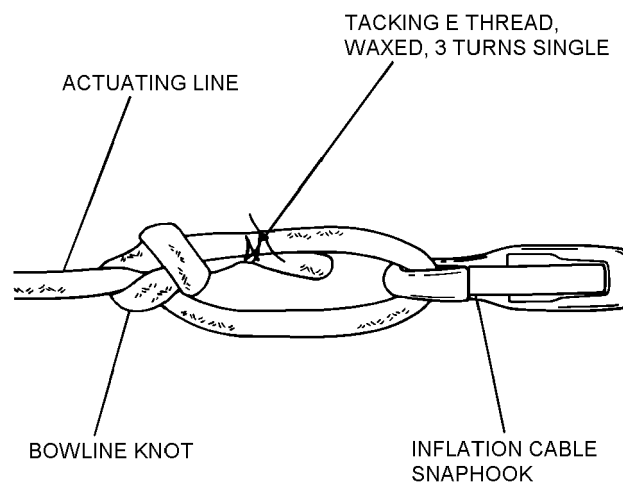
NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modification to the survival items.

3. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap (NIIN 00-142-9008) and secure with rubber bands. Stow accessories and survival items in accessory container and supply pocket. Tie hand pump, installed radio(s), and Manual Reverse Osmosis Desalinator (MROD) to accessory container grommet with a 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

4. Ensure that inflation valve is routed for down-pull, see [figure 9-9](#).

5. Attach 34-inch actuating line (MIL-C-5040 Type III nylon cord) to inflation assembly snaphook with a bowline knot. Tack with three turns of waxed size E nylon thread, single. Tie off tacking with a surgeon's knot followed by a square knot.



Step 5 - Para 9-75

10075005

WARNING

Wrap only the snaphook. If tape extends beyond snaphook to the pullcable housing, it could prevent actuation of the liferaft inflation assembly.

6. Wrap pull cable snaphook with a layer of wide paper tape to prevent snaphook from hanging up inside carrying case after connection.

7. Attach retaining line to neck of CO₂ cylinder with a lark's head knot.

8. Ensure that cylinder valve antichafing sleeve is installed.

9. Fake retaining line, righting line, and sea anchor mooring line, and secure with rubber bands.

10. If heaving lines are installed, stow heaving lines in heaving line pockets as follows:

a. Secure the loose end of the heaving line to the loop in the bottom of the heaving line pocket with a bowline knot.

b. Remove all twists and tangles from heaving line and grommet.

c. Fake the heaving line in 11 to 13-inch bights on a flat surface starting 12 to 15 inches from the loop in the bottom of the heaving line pocket.

d. Continue faking until 15 to 21 inches of line remains, measured from last bight of line to the grommet.

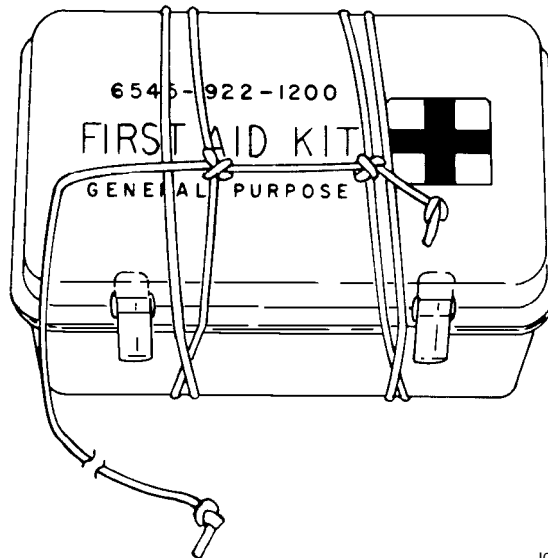
e. Gather the heaving line and place a doubled 2-inch diameter rubber band over the heaving line 1 to 2 inches from each end of the bights.

f. Place the heaving line under the grommet in the heaving line pocket and close the pocket.

11. Ensure that all topping-off valves are closed and liferaft is completely deflated.

12. Secure latches on first aid kit with several layers of pressure-sensitive tape (NIIN 00-266-5016).

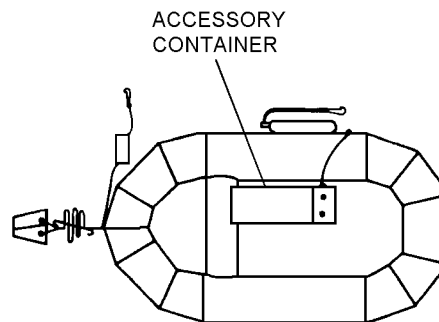
Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container grommet and secure with a bowline knot. Stow first aid kit in accessory container.



10075012

Step 12 - Para 9-75

13. Stow accessory container in liferaft using a 10-foot length of Type III nylon cord, tie to nearest lifeline loop located next to CO₂ cylinder with a bowline knot.



10075013

Step 13 - Para 9-75

14. Secure supply pocket to mating snap fasteners on raft bulkhead. Ensure slider pull tab on supply pocket is tied to nearest lifeline loop with a 60-inch length of Type III nylon cord using bowline knots on both ends.

NOTE

Painter lines shall be installed on all multi-place liferafts. The painter line shall be a 60-foot length of Nylon cord, Type I, MIL-C-5040, NIIN 00-240-2154. The painter line retains a deployed liferaft to the aircraft during emergency egress and is designed to break under a 100-pound pull if the aircraft sinks.

15. Stow painter line in painter line pouch by forming eight 3 1/2-inch bights in line; then inserting each bight in eight hesitator loops provided. Leave 30 inches of unstowed painter line at each end of pouch. See [figure 9-19](#). Close pouch; then secure with hook and pile tape provided.

16. Attach snaphook to end of unstowed painter line extending from open end of pouch with a bowline knot. See [figure 9-19](#).

17. Attach end of painter line without snaphook to the sea anchor mooring patch loop with a bowline knot.

18. Dust entire liferaft lightly with talc (MIL-T-50036A).

WARNING

To prevent malfunction during inflation, ensure that no lifeline, sea anchor mooring line, righting line, painter line, or retaining line entangles or loops liferaft hardware during folding and packing procedures.

19. Fold liferaft in accordance with [figure 9-20](#). Ensure that sea anchor is placed on top of folded liferaft and actuating cord extends from folded liferaft.

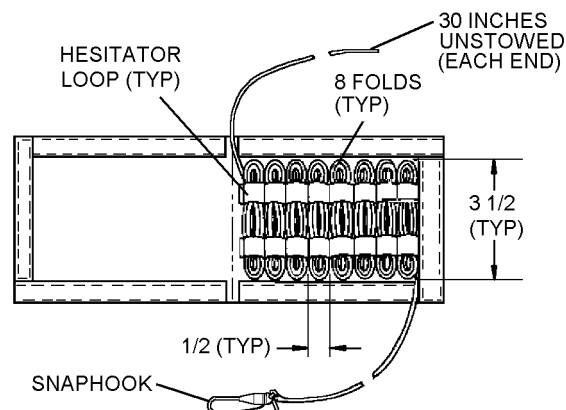


Figure 9-19. Stowed Painter Line

10090019

NOTE

Make a 30-inch center fold when the subject liferaft is packed in a 31-inch carrying case. Make a 35-inch center fold when the subject liferaft is packed in a 36-inch carrying case.

20. Insert rolled liferaft into carrying case so that pulled cable housing and attached actuation line are positioned toward carrying case ripcord handle end flap.

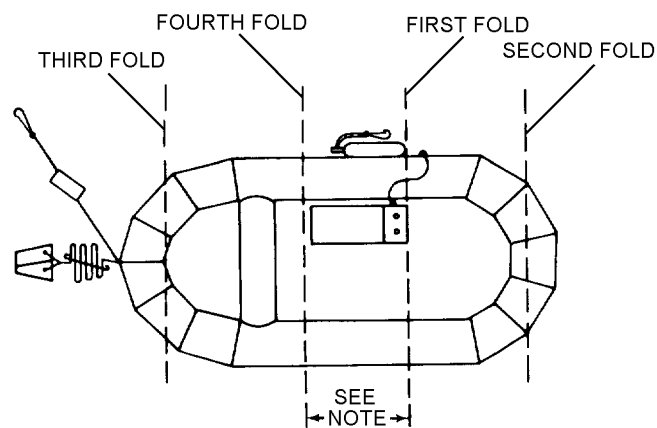
21. Stow painter line pouch behind carrying case end flap opposite from ripcord handle end of container; then attach painter line snaphook to end flap carrying handle.

NOTE

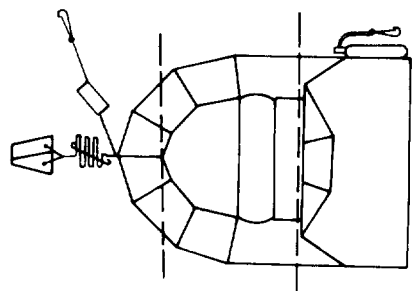
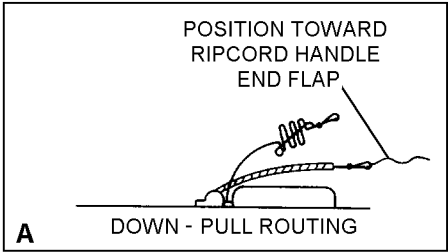
Painter line snaphook shall be attached temporarily to the end flap carrying handle opposite from ripcord end of container. This will provide for easy access to the painter line snaphook for attachment to aircraft.

22. Secure snap fasteners along length of carrying case.

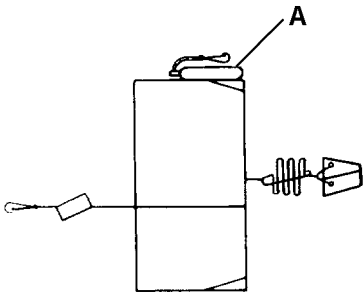
23. Tie free end of actuating line to ripcord cable loop with a bowline knot. Tack with three turns of waxed size E nylon thread, single. Tie off tacking with a surgeon's knot followed by a square knot. See [figure 9-20](#).



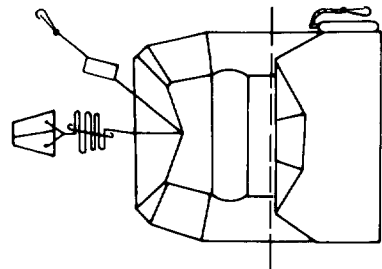
1. RAFT DEFLATED



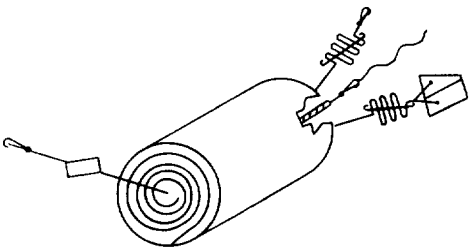
2. FIRST AND SECOND FOLD



4. FOURTH FOLD



3. THIRD FOLD



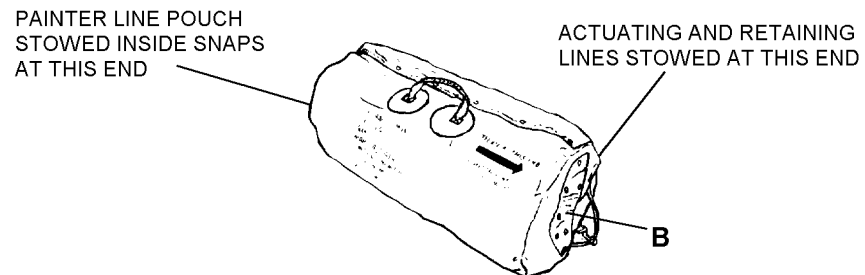
5. RAFT ROLLED
(DOWN - PULL)

NOTE:

CARRYING CASE	CENTERFOLD
31 INCHES	30 INCHES
36 INCHES	35 INCHES

Figure 9-20. LRU-13/A Folding Procedure - (Droppable) (Sheet 1 of 2)

1009A020



6. RAFT PACKED IN A 36 INCH CARRYING CASE

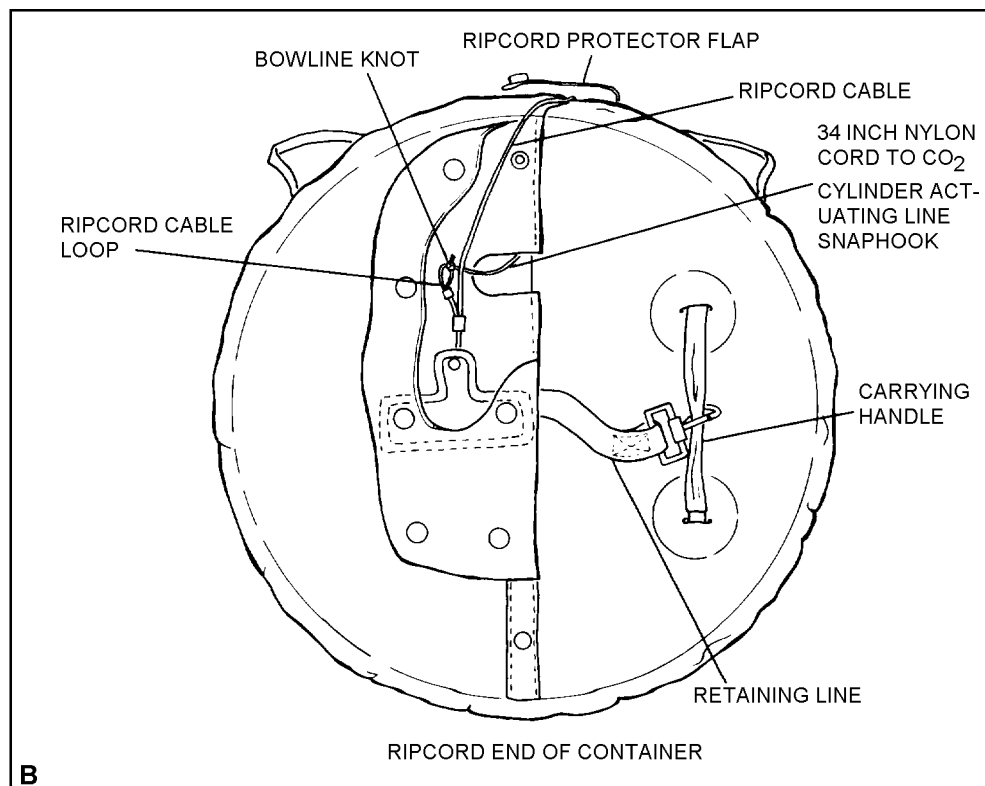


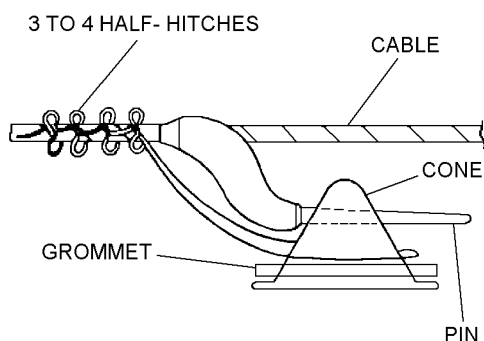
Figure 9-20. LRU-13/A Folding Procedure - (Droppable) (Sheet 2 of 2)

1009B020

NAVAIR 13-1-6.1-1

24. Attach retaining line snaphook to end flap carrying handle on ripcord handle end of container. Snap container closed. See [figure 9-20](#).

25. Install ripcord and safety-tie first and last ripcord pin by passing a 12-inch length of size E nylon thread (V-T-295), single, under ripcord pin. Secure thread to ripcord cable with three or four half-hitches.



Step 25 - Para 9-75

10075025

CAUTION

To prevent pull cable housing breakage, do not stow or store liferaft pack on ripcord handle end of pack.

26. Snap ripcord protector flap closed, position ripcord handle under carrying case end flap, and snap end flap closed. See [step 6](#), [figure 9-20](#).

27. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

9-76. PACKING PROCEDURE FOR LRU-13/A LIFERAFT ASSEMBLY (EXTERNAL RAFT COMPARTMENT). To pack an LRU-13/A liferaft assembly for external liferaft compartment installation, proceed as follows:

NOTE

The emergency equipment container (P/N 62A82D8-1, NIIN 00-552-9132) is no longer required for survival item stowage. The emergency equipment container, packed with styrofoam or other material, or an equivalent dummy pack, shall be stowed with the liferaft in the compartment to prevent liferaft movement and inadvertent inflation.

1. Ensure that liferaft carrying case (if applicable), and accessory container have been inspected in accordance with [paragraph 9-13](#).

2. Ensure that survival items and liferaft accessories have been inspected for expiration and damage. Refer to [table 9-5](#) for items used.

NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modification to the survival items.

Cushioning wrap (air bubble type) (NIIN 00-142-9008) is a suitable substitute for the rubber-coated cloth used to wrap breakable survival items.

3. Wrap breakable survival items with rubber-coated cloth and secure with rubber bands. Stow survival items in accessory container and supply pocket. Tie hand pump and PRT-5 transmitter to accessory container grommet with a 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

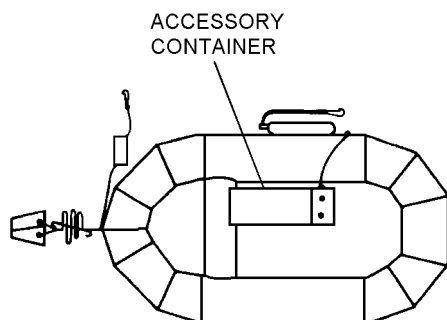
4. Fake righting line and sea anchor mooring line, and secure with rubber bands.

5. If heaving lines are installed, stow heaving lines in heaving line pockets ([paragraph 9-75, step 10](#)).

6. Ensure that all topping-off valves are closed and liferaft is completely deflated.

7. Secure latches on first aid kit with several layers of pressure-sensitive tape (NIIN 00-266-5016). Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container grommet and secure with a bowline knot. Stow first aid kit in accessory container.

8. Tie accessory container to nearest lifeline loop located next to CO₂ cylinder with a bowline knot. Use a 10-foot length of Type III nylon cord.



Step 8 - Para 8-76

10075013

9. Secure supply pocket to mating snap fasteners on raft bulkhead. Ensure slider pull tab on supply pocket is tied to nearest lifeline loop with a 60-inch length of Type III nylon cord using bowline knots on both ends.

NOTE

All liferafts stowed in external liferaft compartments shall be secured to the aircraft with a painter line. The painter line shall be a 60-foot length of Nylon cord, Type I, MIL-C-5040, NIIN 00-240-2154. The painter line retains a deployed liferaft to the aircraft during emergency egress and is designed to break under a 100-pound pull if the aircraft sinks.

10. Stow painter line in painter line pouch by forming eight 3 1/2-inch bights in line and inserting each bight in eight hesitator loops provided. Leave 24 inches of unstowed painter line at each end of pouch. See [figure 9-21](#). Close pouch; then secure with hook and pile tape provided.

11. Attach snaphook to end of unstowed painter line extending from open end of pouch with a bowline knot.

12. Attach end of painter line without snaphook to sea anchor mooring patch with a bowline knot.

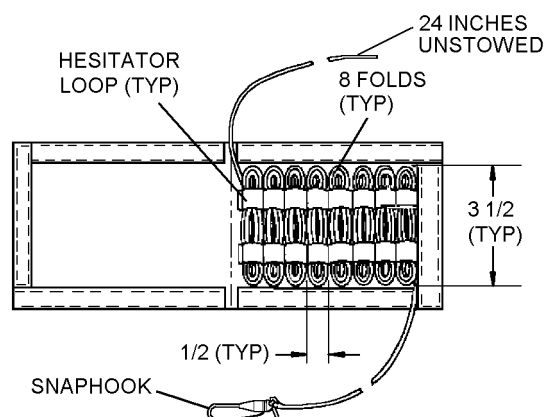


Figure 9-21. Stowed Painter Line

13. Dust entire liferaft assembly lightly with talc (MIL-T-50036A).

WARNING

To prevent malfunction during inflation, ensure that no lifeline, sea anchor mooring line, righting line, painter line, or retaining line entangles or loops liferaft hardware during folding and packing procedures in accordance with the applicable aircraft maintenance manual.

14. Liferaft shall be folded in accordance with the applicable aircraft maintenance manual.

NOTE

When the LRU-13/A is used in C-2 nacelle compartments, an MS22049 carrying case (snap-type) is required; if none are available, a 62A82H601-1 carrying case shall be modified by replacing the locking cones and grommets with nondirectional snap fasteners.

All LRU-13/A liferafts installed in C-2 aircraft shall be packed for down-pull inflation.

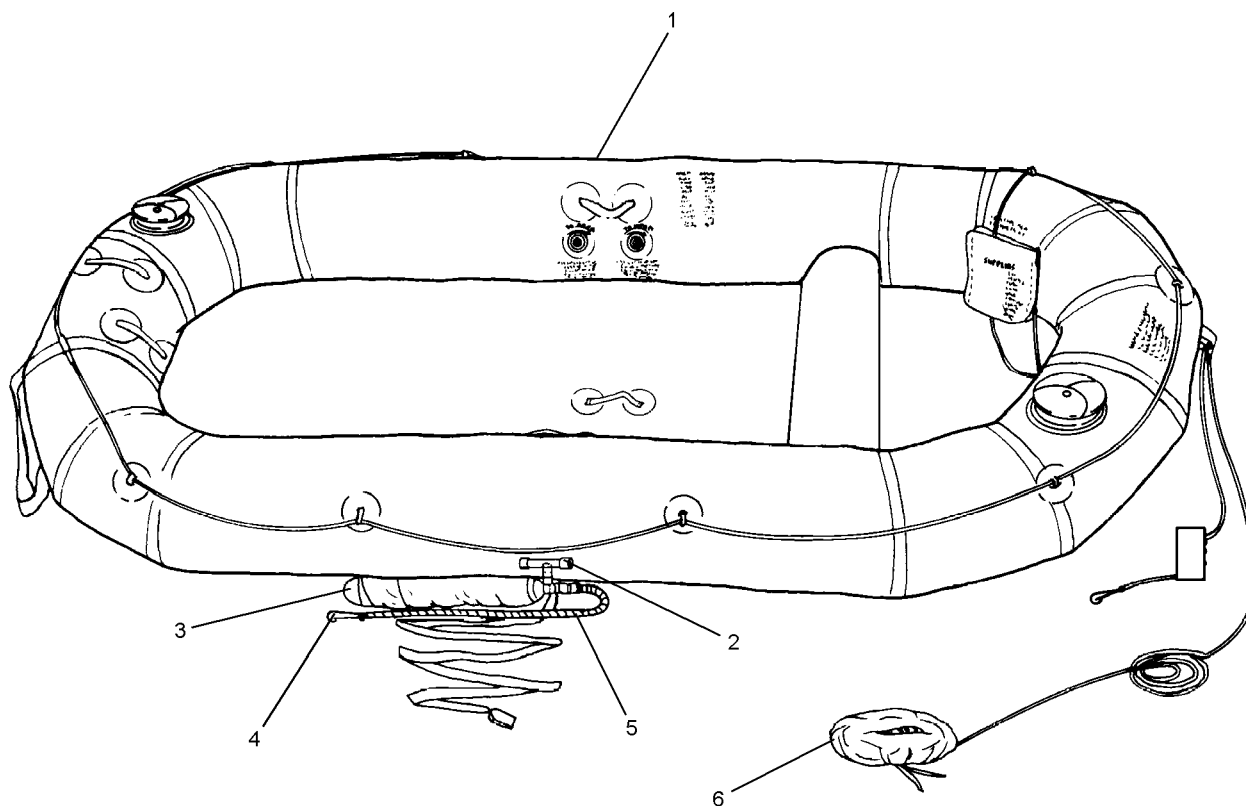
15. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

Section 9-4. Illustrated Parts Breakdown (IPB)

9-77. GENERAL.

9-78. This section lists and illustrates the assemblies and detail parts of the LRU-13/A Inflatable Seven-Man Liferaft.

9-79. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.



10090022

Figure 9-22. LRU-13/A Liferaft Illustrated Parts Breakdown

Figure and Index Number	Part Number	Description							Units Per Assembly	Usable On Code
		1	2	3	4	5	6	7		
9-22		LRU-13/A LIFERAFT ASSEMBLY (Note 5)							REF	
-1	62A82H2-101	. LIFERAFT, Seven-Man Inflatable (Note 1)							1	
-2	63A120H1-71	. . INFLATION VALVE ASSEMBLY (Note 2)							1	
		(Note 3)								
-3	MS26545B2C0147	. . . CO ₂ CYLINDER (Note 2) (Note 3)							1	
	MS26545B4C0147	. . . CO ₂ CYLINDER (Note 2) (Note 3)							1	
-4	1106AS103-1	. . . CABLE ASSEMBLY							1	
-5	1106AS102-1	. . . HOUSING ASSEMBLY							1	
-6	MIL-A-3339	. . SEA ANCHOR, Size 2 (Note 4)							1	
Notes:		1. The inflatable liferaft P/N 62A82H2-101 comes from supply with a CO ₂ cylinder and inflation valve P/N 63A120H1-102. 2. Item is no longer procured or stocked. Item may be obtained through salvage. 3. The inflation valve and CO ₂ cylinder may be requisitioned as a complete assembly (CAGE 30003) P/N 63A120H1-14 NIIN 00-324-1701.								

NAVAIR 13-1-6.1-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
		<p>4. Due to low demand, sea anchors may not be stocked. They may be open purchased from the Patten Co, 1803 Madrid Ave, Lake Worth, FL (561) 588-8500.</p> <p>5. The LRU-13/A is being replaced by the new 8 person MPLR LRU-30/A, P/N 64490-101 on an attrition basis. The LRU-13/A may only be ordered for use in SAR kits. All other 7 person applications must use the new 8 person MPLR LRU-30/A, P/N 64490-101. For MPLR information see Chapter 12.</p>		

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
-------------	----------------------------	--------------

■ MIL-A-3339	9-22-6	PAOZZ
MS26545B2C0147	9-22-3	
MS26545B4C0147	9-22-3	
1106AS102-1	9-22-5	PAOZZ

Part Number	Figure and Index Number	SM&R Code
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1106AS103-1	9-22-4	PAOZZ
62A82H2-101	9-22-1	PAOGG
63A120H1-71	9-22-2	XBOZZ

CHAPTER 10

LRU-14 SERIES (MK-12A-1) LIFERAFT ASSEMBLY

Section 10-1. Description

10-1. GENERAL.

able seat and inflatable floor sections. See Figure 10-1 through 10-5.

NOTE

New procurements of twelve-man liferafts will be designated LRU-14A/A. Reference to the designation MK-12A-1 has been deleted throughout this chapter. However, all procedures and requirements referenced in this chapter pertaining to the LRU-14 series also apply to MK-12A-1 liferafts.

10-2. The LRU-14 series is a twelve-man inflatable liferaft intended for use by aircrew members forced down at sea. It is stowed in a readily accessible area inside the aircraft fuselage or in an aircraft compartment designed for rafts.

10-3. CONFIGURATION.

10-4. The LRU-14 Series Liferaft Assembly consists of a twelve-man liferaft constructed of polychloroprene-coated cloth and an inflation assembly (carbon dioxide cylinder with inflation valve). Two types of carbon dioxide cylinders and two types of inflation valves are available. The liferaft has a two-compartment main tube, a smaller single-compartment upper tube with canopy (new procurement only) attached to the main tube, an inflatable seat, a noninflatable floor attached to the main tube and seat, two inflatable floor sections tied to the noninflatable floor, and a sea anchor. A lifeline, supply pocket and heaving lines with pockets are attached to the main tube. An accessory container is secured to a lifeline patch loop, and a righting line is attached to the lifeline. Survival equipment is stowed in the accessory container and supply pocket. Boarding and righting handles are provided on the main tube and floors. Topping-off valves are located on the upper tube, each main tube section, inflat-

NOTE

To complete the packaged assembly with accessories and survival items, all required components not supplied with the liferaft assembly must be individually requisitioned.

The following subassemblies have been added to newly procured LRU-14A/A liferafts: canopy with related components, and heaving line with pocket. The following subassemblies have been deleted from newly procured LRU-14A/A liferafts: hammock patches, radar mast holder subassembly, starboard supply pocket and one accessory container. New liferafts shall not be reworked to add subassemblies and older liferafts shall not be reworked to add or remove subassemblies since their presence is not detrimental to function of liferaft.

10-5. APPLICATION.

10-6. Multi-place liferafts are authorized for all rotary and fixed wing transport aircraft. Selection shall be based on mission, available storage space, and total number of crew and passengers carried. Additional consideration shall be made for the liferaft inspection cycle. C-130 series (except the C-130J) wing storage is limited to the LRU-15/A in the wing installation configuration. The C-130J wing storage is limited to the LRU-33/A and the Air Cruisers 46-man P/N 63880-103/104. The V-22 is limited to the LRU-34/A and liferafts listed in the current V-22 flight clearance.

Table 10-1. Deleted

10-7. FUNCTION.

10-8. The LRU-14 series liferaft assembly is inflated by pulling the inflation assembly actuating handle, located under the carrying case end flap. The infla-

tion assembly inflates the main tube only. After boarding, the upper tube, seat, and floor sections should be inflated through the topping-off valves with the hand pump provided in the accessory container.

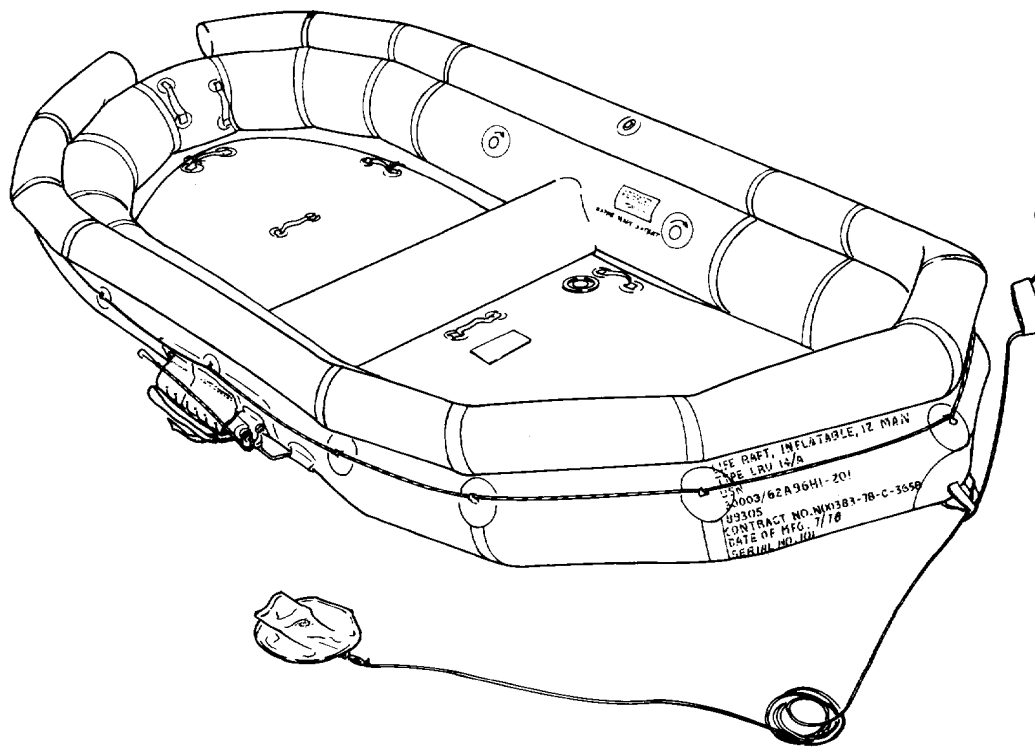


Figure 10-1. LRU-14 Liferaft Assembly

10100001

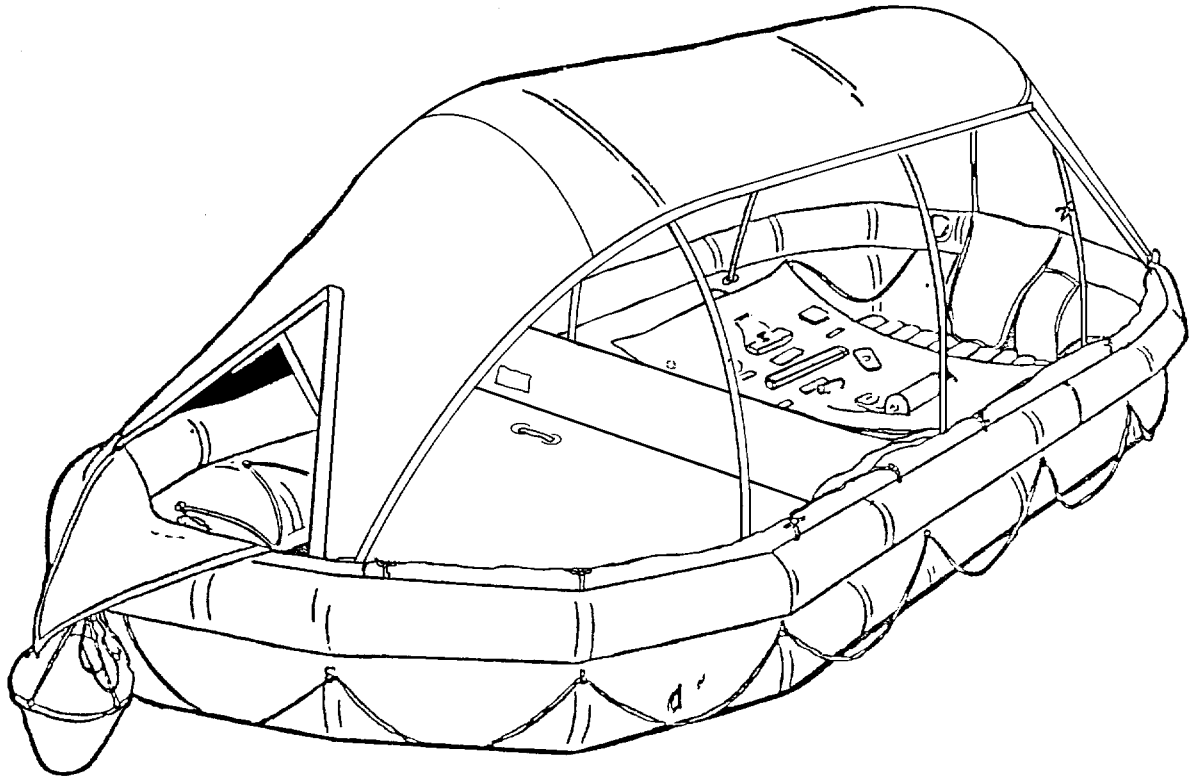


Figure 10-2. LRU-14A/A Liferaft Assembly (Canopy Erected)

10100002

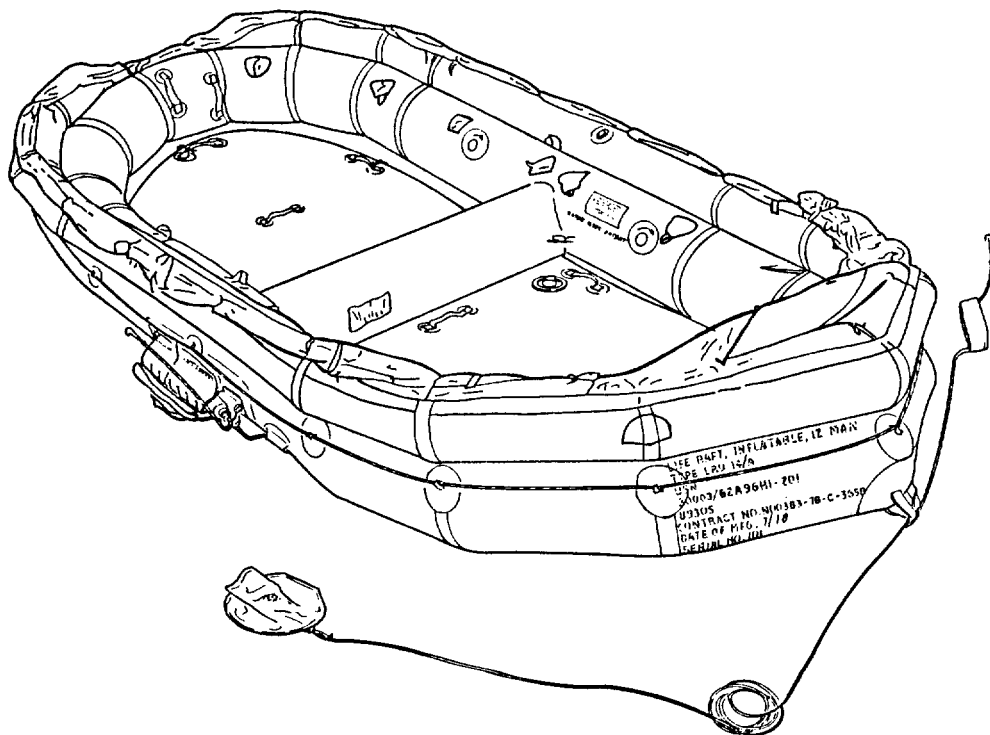
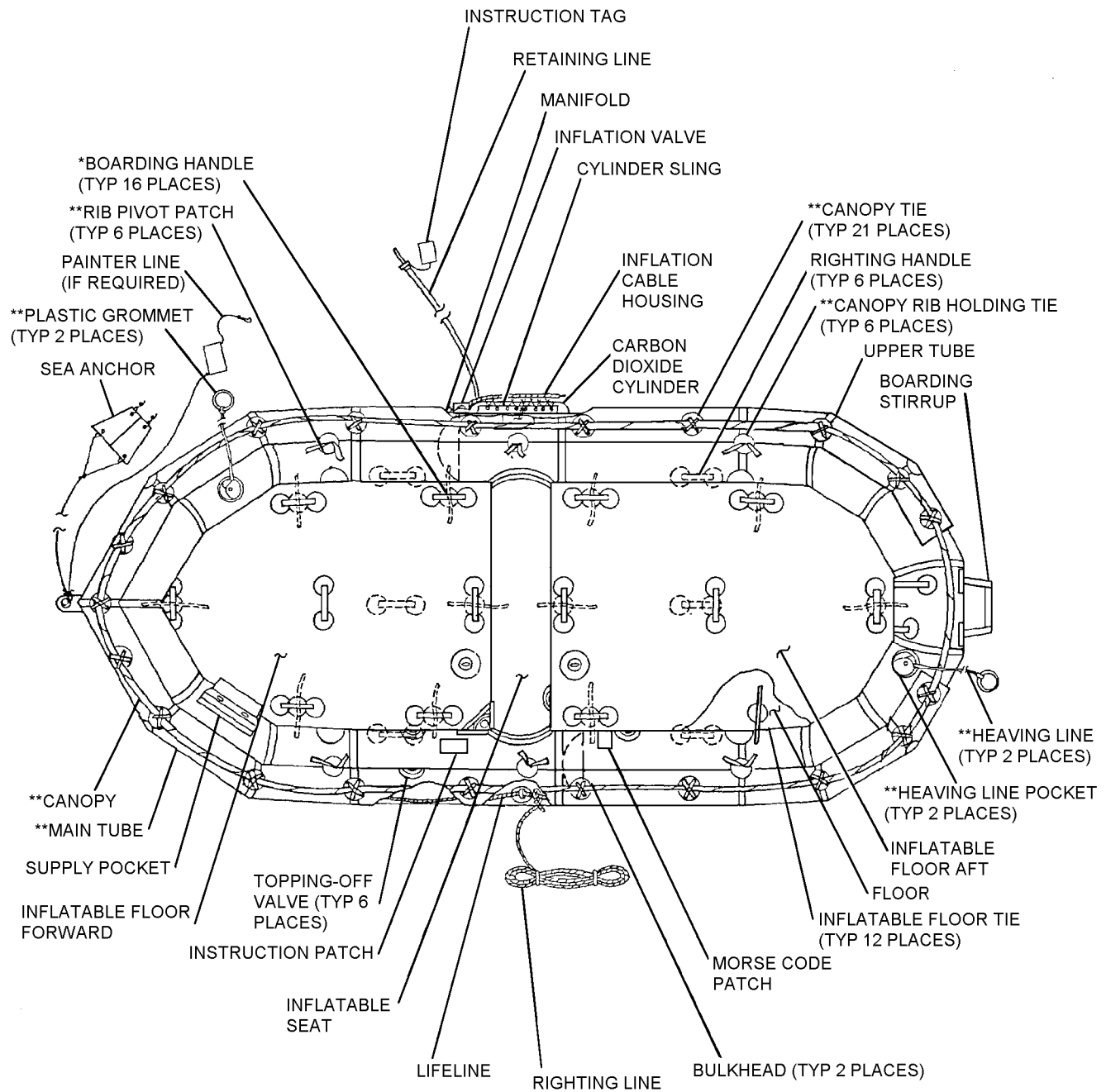


Figure 10-3. LRU-14A/A Liferaft Assembly (Canopy Stowed)

10100003



*SECURING HANDLE (TYP 12 PLACES) LOCATED ON UNDERSIDE OF INFLATABLE FLOOR.

**LRU-14A/A CONFIGURATION

Figure 10-4. LRU-14 Series Liferaft Assembly, Parts Nomenclature (With or Without Canopy)

10100004

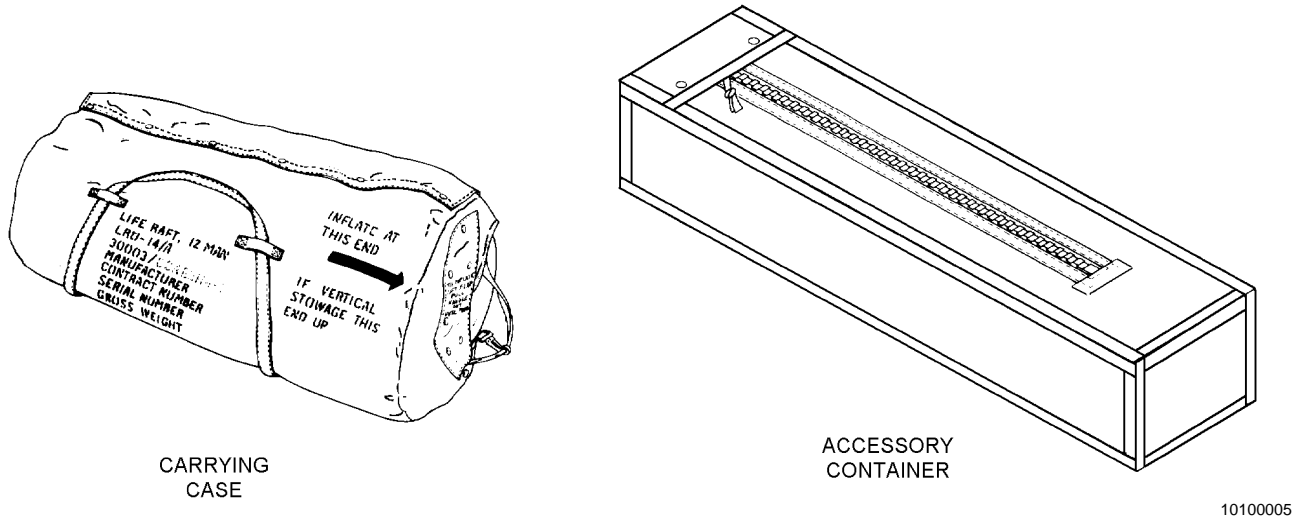


Figure 10-5. LRU-14 Liferaft Assembly Carrying Case and Accessory Container

Section 10-2. Modifications

10-9. GENERAL.

10-10. There are no authorized modifications to the LRU-14 series liferaft assembly at this time. Common repairs and fabrications to maintain serviceability are listed in [table 10-2](#).

Table 10-2. LRU-14 Common Repairs and Fabrications

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	10-50
Cementing Liferrafts	10-51
Patching Liferrafts	10-52
Recementing or Replacing Seam Tapes	10-53
Sea Anchor/Mooring Line Replacement	10-54
Addition of International Morse Code Patch	10-56

Table 10-2. LRU-14 Common Repairs and Fabrications (Cont)

Description of Repair or Fabrication	Paragraph Number
Replacement of Locking Cones	10-57
Relocation of Retaining Line Instruction Tag	10-58
Soldering of Snaphook Spring Latch	10-59
Fabrication of Painter Line Pouch	10-60
Drilling Holes in P/N A128-RT-1	10-61
Drilling Holes in P/N IV0303 Inflation Valve	10-62
Drilling Holes in P/N A128 Inflation Valve	10-63
Drilling Holes in P/N 871444 Inflation Valve	10-64
Fabrication of Cylinder Valve Antichafing Sleeve	10-65
Fabrication of 10-Foot Retaining Line	10-66
Fabrication of Righting Line	10-67
Replacement of Topping-off Valve	10-68
Replacement/Repair of Lifeline	10-69
Replacement of Liferaft Heaving Line	10-70
Repair of Carrying Case	10-70A

Section 10-3. Maintenance

10-11. GENERAL.

10-12. This section contains information on inspection, disassembly, repair/replacement, testing, and reassembly of the LRU-14 Series liferaft.

10-13. INSPECTION.

10-14. All liferaft assemblies shall be subjected to Preflight/Special and Calendar/Phase Inspections.

10-15. The Preflight Inspection shall be performed on fuselage-installed liferafts prior to first flight of the day. This inspection shall be performed by line personnel (plane captain, etc.) or delegated aircrewmember who have been designated by the line division officer, instructed and found qualified by the Aviator's Equipment Branch.

10-16. The Special Inspection shall be performed on fuselage-installed liferafts every 30 days. This inspection shall be performed at the organizational level of maintenance by personnel assigned to the Aviator's Equipment Branch. Upon completion, the date of inspection shall be recorded.

tion and inspector's signature shall be entered on the appropriate form in accordance with OPNAVINST 4790.2 Series.

10-17. All liferafts shall be subjected to the Calendar/Phase Inspection prior to placing in service or, if an aircraft inventory item, at the time of the aircraft Acceptance Inspection. Thereafter, the Calendar/Phase Inspection interval shall coincide with the aircraft inspection cycle in which they are installed. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 231 days. Unless operational requirements demand otherwise, the liferaft Calendar/Phase Inspection shall be performed by intermediate level of maintenance or above.

NOTE

A functional test and pull cable proof load test shall be performed prior to placing in service or during aircraft Acceptance Inspection, and each fourth inspection cycle thereafter. A leakage test shall be performed at each inspection cycle. If inspection indicates damage beyond capability of maintenance, complete applicable forms in accordance with OPNAVINST 4790.2 Series and forward entire assembly to supply. Refer to [paragraph 10-50](#) for determination of repairability.

10-18. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

10-19. PREFLIGHT/SPECIAL INSPECTION (FUELAGE-INSTALLED LIFERAFTS). To perform a Preflight/Special Inspection, visually inspect for the following:

CAUTION

Do not open liferaft access doors or any sealed or safety-wired/safety tied portion of liferaft for this inspection.

1. Fabric for cuts, tears, deterioration and abrasion.
2. Seams for proper adhesion or stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage and security.
5. All hardware for security of attachment, corrosion, damage, wear, and if applicable, ease of operation.
6. Liferaft retaining line for proper stowage.
7. Liferaft painter line for presence and attachment.
8. Heaving line for proper stowage (if applicable).
9. Ensure that liferaft is properly stowed. Check for bulges caused by trapped air in liferaft.
10. Ripcord pins and cable for bends, fraying, or other damage; ripcord pins for security of attachment to cable.
11. Swaged ball on handle and swaging sleeve on cable for security.

WARNING

Use only authorized safety tie. No tape, wire, or cord shall be employed to secure ripcord pins.

12. Ripcord pins fully inserted into cones, first, middle and last and ripcord pins safety-tied to cones, with one turn size E nylon thread (V-T-295), single.

13. Snap fasteners on end flaps and ripcord protector flap securely fastened.

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14. If discrepancies are found or suspected, Maintenance Control shall be notified.

10-20. ACCEPTANCE/CALENDAR/PHASE INSPECTION. The Acceptance/Calendar/Phase Inspection consists of the following major tasks (to be performed in the order listed):

1. Container/Case Inspection
2. Functional Test (If Required)
3. Pull Cable Proof Load Test (If Required)
4. Deflation
5. Visual
6. Liferaft Configuration
7. General Inspection
8. Markings Inspection
9. Survival Items and Accessories Inspection
10. Inflation Assembly Inspection
11. Inspection of Inflation Assembly (Charged)
12. Inspection of Inflation Assembly (Discharged)
13. Cylinder Markings
14. Leakage
15. Records Updating
16. Repacking

10-21. PACKED CONTAINER/CASE INSPECTION. To inspect packed containers/cases, examine the following:

1. Fabric for cuts, tears, deterioration, and abrasion.
2. Seams for proper adhesion of stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage, and security.
5. All hardware for security of attachment, corrosion, damage, wear and, if applicable, ease of operation.

10-8 Change 2

6. Container and/or case for stains, dirt, and general condition.

10-22. FUNCTIONAL TEST. To functionally test a liferaft, proceed as follows:



Ensure that there is adequate area free of foreign objects for liferaft inflation.

1. Open liferaft case and unfold liferaft. The functional test shall be performed with the carbon dioxide bottle that was attached during the raft's last inspection. If actuation of the attached bottle will cause it to be non-RFI due to hydrostatic test requirements, and no replacement bottles are available, contact fleet support team for instructions.

2. Actuate inflation assembly.

3. Measure time of inflation; liferaft shall inflate to design shape without evidence of restriction in less than 1 minute.

4. Examine liferaft for obvious damage such as cuts, tears, ruptured seams, and damaged manifold.

5. (LRU-14A/A with canopy) Untie canopy from upper inflation tube. Examine canopy for damage such as tears, cuts, ruptured seams, defects in material, patches for proper adhesion and general cleanliness. Inspect canopy slide fasteners for proper location of pulls on inside of canopy and ease of operation.

6. (LRU-14A/A with canopy) Erect canopy to functionally check all canopy components as follows:

a. Extend the 3 canopy ribs to full length (stowed in accessory corner).

NOTE

Ensure canopy rib markings "THIS SIDE TOWARD CANOPY" are facing outward away from liferaft when accomplishing step 6.b.

b. Secure one end of rib in rib pivot patch and pass nylon cord (MIL-C-5040, Type I) through pivot patch eyelet hole, rib eyelet hole, and opposite pivot patch eyelet hole. Tie in place.

c. Tie rib to side of inflation tube with canopy rib holding tie.

d. Bend canopy rib in an arch across liferaft. Ensure markings are on upper surface of rib. Secure free end of canopy rib in canopy pivot patch as in [step b](#) above, and secure canopy rib holding tie on side of inflation tube.

e. Place remaining 2 ribs in position as in [steps b, c, and d](#) above.

f. Extend canopy center, side and end sections, secure in position with canopy rib ties on inside of canopy sections. Secure with slide fasteners.

g. Restow canopy by reversing above procedure and secure rolled canopy to upper inflation tube with canopy ties.

h. Stow canopy ribs in accessory container.

7. Determine cause if liferaft does not properly inflate. Remove CO₂ bottle and inflation assembly and inspect inlet valve for cleanliness and embedded foreign matter.

8. If correction is made, repeat [steps 2 through 4](#).

9. Deflate liferaft in accordance with [paragraph 10-24](#). Ensure that all carbon dioxide has been removed.

10-23. PULL CABLE PROOF LOAD TEST. To perform the proof load test, proceed as follows:

NOTE

Perform the Proof Load Test only after the functional test and prior to placing an inflation assembly in service.

1. Remove inflation valve cover plate.

2. Remove pull cable from valve and apply a 50-pound pull force between cable ball and snaphook.

3. Examine pull cable for broken strands of wire, deformed snaphook, security of snaphook spring latch attachment, and loose or cracked swage fittings. If any damage is found, the pull cable shall be discarded and replaced with a new cable. The new cable shall also be tested in accordance with [step 2](#). If snaphook spring latch is loose, it may be repaired in accordance with instructions contained in modification section

for the liferaft, or replaced at the discretion of the inspection activity.

4. If pull cable passes this test, reinstall in accordance with [paragraph 10-46](#).

10-24. DEFLATION. To deflate liferaft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Vacuum Unit	61E44688 (CAGE 80049)
As Required	Hose, Rubber, 3/8 or 1/2 inch Inside Diameter	—

1. Attach one end of rubber hose to vacuum pump.

2. Open Topping-Off valve and hold vacuum pump hose over opening in valve. When compartment is collapsed, screw valve closed.

10-25. VISUAL INSPECTION. Prior to visually inspecting a liferaft assembly, the liferaft (and inflatable floors) shall be inflated with air to 1.0 psig.



Remove CO₂ cylinder prior to inflating liferaft with air.

1. Remove CO₂ cylinder from CO₂ cylinder sling.



Ensure that diffuser plug is installed in CO₂ cylinder.

NOTE

If a suitable air source is not available, water pumped nitrogen (BB-N-411) may be substituted.

2. Inflate liferaft with air to 1.0 psig.

10-26. LIFERAFT CONFIGURATION. The liferaft shall be updated by comparing it to the applicable configuration illustrations in figures 0-1 through 0-5.

10-27. GENERAL INSPECTION. The general inspection is performed as follows:

NOTE

If color, location, or stitching patterns of repaired, replaced, or previously incorporated noncritical items or features (eg, liferaft pockets, handle, ballast bag, sea anchor, etc.) do not exactly conform to instructions, do not remove or rework item or feature if flotation stability or capability and security of attachment are not compromised.

- 1. Liferaft fabric for cuts, tears, punctures, deterioration and abrasion.
- 2. Seam tapes for proper adhesion.
- 3. Seam tapes joining tubes to floors, other tubes or canopy for adhesion and wear.
- 4. Liferaft floor and canopy for cuts, tears, punctures, and abrasions.
- 5. All patches for proper adhesion.
- 6. Pockets for tears, abrasions, and security of attachment.
- 7. Handles for wear, deterioration, and security of attachment.
- 8. Sea anchor for wear, tears, and security of attachment.
- 9. Damaged or deteriorated topping-off valve, if applicable, and security of retaining screw.
- 10. All hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.
- 11. Liferaft for stains, dirt, and general cleanliness.
- 12. Any other parts for wear and damage.

10-28. MARKINGS INSPECTION. Compare markings on liferaft and case and/or container to markings shown in tables 0-3 through 0-6 as applicable. Replace faded markings. Install/replace inspection record patch as needed; refer to paragraph 10-55. Install/re-

place International Morse Code patch as needed; refer to paragraph 0-56. Correct any markings which do not agree with the applicable table. To change markings, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Marking, Laundry, Black	SPE-92 NIIN 00-161-4229
	-or-	
	Ink, Drawing, Waterproof, Yellow	A-A-59291 NIIN 00-634-6583

- 1. Paint over incorrect marking using waterproof ink (yellow or black as applicable).
- 2. Add correct marking as close as possible to specified location using waterproof ink.

10-29. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

Refer to NAVAIR 13-1-6.5 for information on inspection/replacement and modification of survival items.

With the exception of batteries, items reaching over-age while packed in survival kits and rafts shall remain in service until the next inspection cycle of the completed assembly.

- 1. Inventory all accessories and survival items by checking items against table 10-7. Replace missing or unsatisfactory items.

NOTE

Ensure URT-33 battery service life does not expire prior to the next scheduled calendar inspection. Refer to NAVAIR 16-30URT33-1 for battery service life. Batteries which exceed service life requirements must be discarded regardless of their condition.

- 2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

Table 10-3. LRU-14 Series Liferaft Markings

Marking	Location	Letter Height
LIFERAFT, INFLATABLE 12-MAN TYPE LRU-14 Series USN 30003/62A96H1- [applicable dash number] MANUFACTURER'S IDENTIFICATION CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Tube, starboard side of bow, outboard	1 inch
KEEP EVERYTHING TIED TO RAFT TO AVOID LOSS IN CASE OF CAPSIZING	Starboard side aft, port side forward	1/2 inch
INSTRUCTIONS PUT OUT SEA ANCHOR. INFLATE TOP TUBE BY HAND PUMP THROUGH VALVE, PORT SIDE, AMIDSHIPS AT TOP INFLATE FLOOR THROUGH TWO VALVES LOCATED ON FLOOR SECTIONS PORT SIDE AMIDSHIPS. INFLATE SEAT THROUGH VALVE LOCATED ON STERN OF SEAT PORT SIDE.	Main tube, inboard and amidships on starboard side	First line 1 inch; all other lines 1/2 inch
SUPPLIES KNIFE WHISTLE NYLON CORD COMPASS FLARE GUN STROBE LIGHT STEADY BURNING LIGHT	Supply pocket on port side	First line 1 inch; all other lines 1/4 inch
FORWARD THIS SIDE UP	Inflatable floor, forward section midway between bow and amidships on starboard side	1/2 inch
AFT THIS SIDE UP	Inflatable floor, AFT section midway between bow and amidships on starboard side	1/2 inch

Table 10-3. LRU-14 Series Liferaft Markings (Cont)

Marking	Location	Letter Height
INFLATION VALVE OPERATION TO INCREASE TUBE PRESSURE 1. SCREW HAND PUMP INTO VALVE CAP 2. ROTATE VALVE CAP 1 1/2 TURNS TO RIGHT 3. PUMP TO INFLATE TO DESIRED PRESSURE 4. ROTATE VALVE CAP 1 1/2 TURNS TO LEFT AND REMOVE PUMP TO DECREASE PRESSURE 1. ROTATE VALVE 1 1/2 TURNS TO THE RIGHT AND BLEED	Under or along side of the topping-off valves on the port liferaft tube inboard and seat tube	3/8 inch 1/4 inch 3/16 inch 1/4 inch 3/16 inch
INTERNATIONAL MORSE CODE [see figure 10-12]	Inboard, port side, aft of seat	1/4 inch
BEFORE INFLATION CLIP SNAPHOOK TO LIFE VEST	On tag attached to webbing retaining line	3/8 inch
TUBE SECTION NUMBERS	Each tube section	1/2 inch
SEA ANCHOR MIL-A-3339B Type I Size 2 MANUFACTURER CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year]	Inside sea anchor	1/4 inch
HEAVING LINE	Stenciled on tube, inboard below assembly	1/2 inch
THIS SIDE TOWARDS CANOPY	Both end sections of each Canopy Rib Assembly.*	5/8 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink. * CANOPY RIB ASSEMBLY (3), stowed in Accessory Container		

Table 10-4. LRU-14/A Case and Container Markings


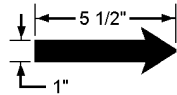
Case/Container	Marking	Location	Letter Height
Carrying Case	LIFERAFT, 12 MAN LRU-14/A 30003/62A96H4-1 MANUFACTURERS IDENTIFICATION CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable numbers]	Side panel	1 inch
	INFLATE AT THIS END 	Both sides of case at pull handle end	1 inch 
	IF VERTICAL STOWAGE THIS END UP	Both sides of case below arrow	1 inch
	INFLATE OTHER END	End panel opposite pull handle end	1 inch
	TO INFLATE, LIFT FLAP, PULL HANDLE OUT UNTIL FREE	Pull handle flap	1/2 inch
Accessory Container	Each accessory container shall be marked with the name of the equipment stored in the container. Refer to table 10-7 .	Panel opposite side containing slide fastener	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.			

Table 10-5. MK 12A-1 Liferaft Markings

Marking	Location	Letter Height
MARK 12A-1 LIFERAFT BUREAU OF NAVAL WEAPONS, USN SPECIFICATION MIL-I-1849B (WEP) MANUFACTURER'S [applicable name] CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Main tube, port side of bow, outboard	1 inch
KEEP EVERYTHING TIED TO RAFT TO AVOID LOSS IN CASE OF CAPSIZING	Main tube, inboard	1/2 inch
INSTRUCTIONS PUT OUT SEA ANCHOR. INFLATE TOP TUBE BY HAND PUMP THROUGH VALVE, PORT SIDE, AMIDSHIPS AT TOP INFLATE FLOOR THROUGH TWO VALVES LOCATED ON FLOOR SECTIONS PORT SIDE AMIDSHIPS. INFLATE SEAT THROUGH VALVE LOCATED ON STERN OF SEAT PORT SIDE.	Main tube, inboard and amidships on starboard side	First line 1 inch; all other lines 1/2 inch
SUPPLIES FLARE GUN SIGNAL LIGHT SIGNAL MIRROR RADIO CODE CARD WHISTLE COMPASS KNIFE LINE	Supply pocket on port side	First line 1 inch; all other lines 1/4 inch
FORWARD THIS SIDE UP	Inflatable floor, forward section midway between bow and amidships on starboard side	1/2 inch
AFT THIS SIDE UP	Inflatable floor, aft section midway between bow and amidships on starboard side	1/2 inch

Table 10-5. MK 12A-1 Liferaft Markings (Cont)


Marking	Location	Letter Height
SEA ANCHOR MIL-A-3339B Type I Size 2 MANUFACTURER CONTRACT NO. [applicable name]	Inside sea anchor	1/4 inch
<p><u>TO INFLATE COMPARTMENTS MANUALLY</u></p> <p>ATTACH HAND PUMP TO VALVE CAP, UNSCREW CAP 1 1/2 TURNS TO THE RIGHT, AND THEN PUMP TO INFLATE RAFT, WHEN DESIRED PRESSURE IS ATTAINED, TIGHTEN VALVE CAP AND REMOVE PUMP.</p> <p><u>TO DECREASE PRESSURE</u></p> <p>OPEN VALVE 1 1/2 TURNS TO THE RIGHT AND BLEED.</p>	On white rubber patch located on main tube adjacent to topping-off valves	1/4 inch
<p>TO OPEN</p> 	Outer cover patch of each topping-off valve	1/2 inch
INTERNATIONAL MORSE CODE [see figure 10-12]	On a orange patch located on inflatable floor forward of inflatable seat	1/4 inch
BEFORE INFLATION CLIP SNAPHOOK TO LIFE VEST	On a tag attached to webbing retaining line	1/2 inch
HEAVING LINE	Stenciled on tube, inboard below assembly	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.		

Table 10-6. MK 12A-1 Case and Container Markings


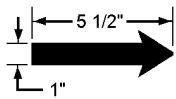
Case/Container	Marking	Location	Letter Height
Carrying Case	MK 12A-1 LIFERAFT BUREAU OF NAVAL WEAPONS, USN SPECIFICATION MIL-L-18494B MANUFACTURER CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable number]	Side panel	1 inch
	INFLATE AT THIS END 	Both sides of carrying case at pull handle end	1 inch 
	IF VERTICAL STOWAGE THIS END UP	Both sides of case below arrow	1 inch
	INFLATE OTHER END	End panel opposite pull handle end	1 inch
	TO INFLATE, LIFT FLAP, PULL HANDLE OUT UNTIL FREE	Pull handle flap	1/2 inch
Accessory Container	Each accessory container shall be marked with the name of the equip- ment stored in the container. Refer to table 10-7 .	Panel opposite side containing slide fastener	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.			

Table 10-7. LRU-14 Series Survival Items

Description	Quantity Required	Reference Number	NIIN	SM&R Code
<u>Packed In Accessory Container</u>				
Desalter Kit, Sea Water, MK2, Type II (Note 11)	6	MIL-D-5531E	00-372-0592	PAOZZ
Sea Dye Marker	5	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal, MK-124 MOD 0 or Signal Kit, MK-189 MOD 0 (Note 9)	8	—	01-030-8330	—
	1	—	L564-1370-01-418- 2657	—
Water Storage Bag (Size A)	4	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Note 13)		—	01-124-4543	PAOZZ
	12			
	30			
First Aid Kit, Size A	1	SC-C-6545-IL Vol. #2	00-922-1200	—
Desalinator, Manual Reverse Osmosis (Notes 7 and 13)	1	—	01-313-6086	—
Sunburn Preventative Preparation	2	MIL-S-37800	01-121-2336	PAOZZ
Food Packet, Liferaft	12	MIL-F-15381	01-028-9406	PAOZZ
Bailing Sponge	4	L-S-626	00-240-2555	PAOZZ
Hand Pump	1	MIL-P-8258	00-097-4580	PAOZZ
Combat Casualty Blanket Type I	2	MIL-B-36964	00-935-6665	PA--Z
Hand Generated Flashlight A-9 (Note 2)	1	MIL-F-8209	00-283-9806	PAOZZ
Canopy Rib Assembly (Note 10)	3	601AS105-1	01-322-9303	PAOZZ
3 - Sectional Oars (Note 10)	2	MS26429-2	00-485-3010	PAOZZ
<u>Packed In Supply Pocket</u>				
Flare Gun, MK-79 MOD 0 (Note 9)	1	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or Signal Light (Strobe) SDU-39/N	1	MIL-L-38217	00-067-5209	PAOZZ
			01-411-8535	
Light, ChemiLuminescent (Note 12)	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Note 3) or Signal Mirror, Type II	1	MIL-M-18371	00-105-1252	PAOZZ
		MIL-M-18371	01-455-6695	PAOZZ
			01-455-6671	PAOZZ
Survival Radio (Notes 4 and 5) and/or Radio Beacon AN/URT-33A (Notes 4 and 8)	As Required	—	—	—
	As Required	MIL-B-38401	00-160-2136	PAOGG

Table 10-7. LRU-14 Series Survival Items (Cont)

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Code Card (Note 6)	1	—	—	—
Whistle, Type II	1	MIL-W-1053	00-254-8803	PAOZZ
Compass, Pocket, Type MC-1 (Note 1) or Compass, Wrist	1 1	MIL-C-17850 WCC-100	00-515-5637 00-809-5252	PAOZZ PAOZZ
Pocket Knife	1	MIL-K-818C	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	MIL-C-5040	00-240-2154	PAOZZ
<p>Notes:</p> <ol style="list-style-type: none">1. Use MIL-C-17850 until stock is depleted, then use WCC-100.2. Required for Arctic missions; optional otherwise.3. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted.4. Survival radio or radio beacon requirements shall be in accordance with OPNAVINST 3710.7 Series. Following radios apply: Voice-Beacon: AN/PRC-90, AN/PRC-90-2, and AN/PRC-149. Beacon only: AN/URT-33, AN/PRT-5, and AN/PRC-140. The AN/PRC-149 will become the preferred radio when available.5. If PRT-5 transmitters are carried, they shall be packed in the accessory container.6. Refer to NAVAIR 13-1-6.5.7. MROD shall be used if RFI assets are available (See Note 13).8. Ensure battery service life does not expire prior to next scheduled special inspection. Refer to the applicable manual for the installed radio for battery service life.9. MK-189 MOD 0 Signal Kit contains 6 MK-124 Day/Night flares and 2 MK-79 MOD 0 flare guns. If MK-189 MOD 0 is used, MK-79 MOD 0 will not be put in supply pocket.10. Required in LRU-14A/A only.11. Authorized for use in Arctic/Antarctic environments.12. Chemical Lights will replace SDU-30. If chemical lights are not available, SDU-30 may be used until next repack.13. MROD should not be used where water temperatures are below 36°F.				

3. Operate all items which are not expended in use. Replace as necessary.

10-30. INFLATION ASSEMBLY INSPECTION. Inspect the inflation assembly as follows:

10-31. Inspection of Inflation Assembly (Charged). To inspect a charged inflation assembly, proceed as follows:



Gas under pressure. Do not attempt to remove valve from cylinder.

1. Inspect cylinder markings. Re-mark as required in accordance with paragraph 10-33.

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damage or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced perform pull cable proof load test in accordance with paragraph 10-23.

NOTE

To obtain the correct gross weight of the CO2 cylinder, subtract weight of the diffuser plug from total weight indicated on scale.

3. Weight inflation assembly. If weight indicated on scale is not the same as the gross weight printed on the cylinder (P/N MS26545B2C205A or P/N

MS26545B4C205A) with tolerance specified, or if no gross weight is printed on the cylinder, discharge the cylinder and recharge it to 4.74 to 4.86 lbs in accordance with [paragraph 10-45](#).

WARNING

Inspect safety wire to ensure that wire size and type are as specified in [paragraph 10-46](#).

4. If necessary, safety-wire the assembly in accordance with [paragraph 10-46](#).

10-32. Inspection Of Inflation Assembly (Discharged). To inspect a discharged inflation assembly, proceed as follows:

1. Inspect cylinder markings. Re-mark as required in accordance with [paragraph 10-33](#).

2. Check date of last hydrostatic test. If greater than 5 years see [paragraph 10-42](#) for disposition.

3. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damaged or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced, perform pull cable proof load test in accordance with [paragraph 10-23](#).

4. Recharge assembly in accordance with [paragraph 10-45](#).

10-33. Cylinder Markings. Markings on all CO₂ inflation cylinders shall be in black letters 1/4 inch high. Information shall include gross weight, tare weight, and weight of CO₂. In addition, multiplace life-raft cylinders shall be marked with the following information in 1 inch red letters: WARNING - COMPRESSED GAS - DO NOT DROP. Paint and stencil cylinder as required. Weight of CO₂ is 4.74 to 4.86 lbs. Ensure that all markings are included as necessary.

10-34. LEAK TEST. To perform a leak test, proceed as follows:

CAUTION

Liferaft should not be disturbed during leakage test.

10-35. Test Fixtures. As assembled, test fixtures are not stocked in the Supply System; fixtures must be fabricated to meet the requirements of the schematic shown in [figure 10-6](#). A suggested test fixture consisting of a three, way valve, pressure gage, and suitable adapters for the compartments being tested is shown in [Chapter 3](#).

10-36. Test Procedure. To test liferafts for leakage using test fixture in [Chapter 3](#), proceed as follows:

CAUTION

Ensure that area surrounding liferaft is clear of foreign objects.

If three-way valve is not used, measuring device valve must be closed when air-feed valves are open.

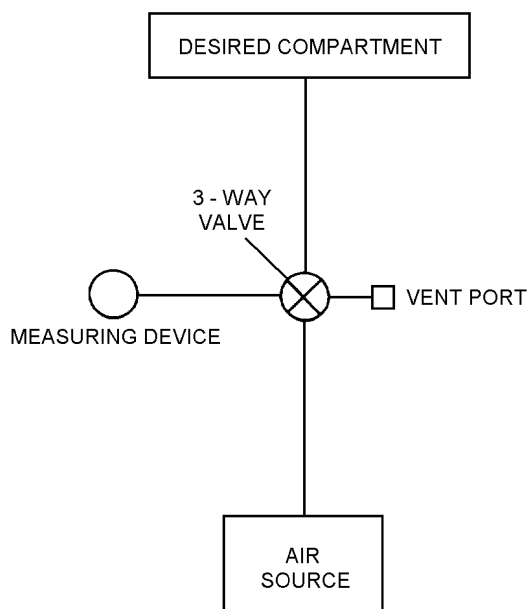


Figure 10-6. Test Fixture Schematic

10100006

NOTE

If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

Refer to [table 10-8](#) for information regarding inflation pressure and listing of compartments which may be tested simultaneously.

1. Open topping-off valve then thread adapter into topping-off valve threads. Open air supply valve and inflate liferaft. Alternately position valve at measuring device, vent and air supply until proper pressure is attained. Refer to [table 10-8](#).

2. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure shall be readjusted, if necessary, to the leakage test pressure. Refer to [table 10-8](#).

3. Disconnect air supply and check for leaks. Ensure that all valves are closed.

4. Record temperature and barometric pressure and allow raft to remain undisturbed for a minimum of 4 hours. Record time.

NOTE

If the raft has been stacked during the 4-hour inspection period remove from stacking and place in a horizontal position on the floor or table in the inspection area and take test pressure reading. In no event shall the pressure in the raft be determined with another raft stacked upon it.

5. At the end of a minimum of 4 hours after the readjustment period in [step 4](#) record test pressure.

NOTE

Steps 6 through 13 shall be performed only after leakage test readings have been recorded.

6. Record temperature and barometric pressure and correct test pressure for any changes in temperature and barometric pressure. Refer to [tables 10-9](#) and [10-10](#).

EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	- 5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057

UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

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Step 6 - Para 10-36

7. If pressure of compartment is below pressure limits in [table 10-8](#), inflate to leakage test pressure and check for leaks, using a soap solution. Mark leaks, rinse with fresh water, and dry with a lint free cloth. Determine repairability in accordance with [paragraph 10-50](#).

Table 10-8. Flotation Compartment Pressures

LRU-14/A Compartment	Leakage Test Pressure (psig)	Minimum Pressure (psig)
Bow Section	2.0	1.60
*Stern Section	2.0	1.60
*Upper Tube	1.0	0.60
*Inflatable Floor	1.0	0.60
Sections		
*Inflatable Seat	1.0	0.60
*Compartments may be tested simultaneously.		

Table 10-9. Temperature Conversion Chart

Temperature Difference (Degree F.)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.248
9	0.289
10	0.310
Rise in temperature: subtract from gage reading. Fall in temperature: add to gage reading.	

8. Apply a small amount of soap solution to manifold, and inspect for leaks. Inspect for damage, excessive wear and corrosion.

9. Apply a small amount of soap solution around topping-off valve and check for leaks.

10. Deflate liferaft in accordance with paragraph 10-23.

11. Attach retaining line to neck of cylinder with a lark's head knot (see paragraph 10-71).

12. Install cylinder valve anti-chafing sleeve.

13. Reinstall properly charged inflation assembly.

14. Tighten coupling nut to raft inlet manifold to a torque value of 140 to 150 in-lb.

15. Lace cylinder sling closed and snap cover over lacing where applicable.

10-37. RECORDS UPDATING. Make necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

Table 10-10. Barometric Pressure Conversion Chart

Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368
Rise in pressure: add to gage reading. Fall in pressure: subtract from gage reading.									

10-38. CLEANING AND SERVICING.

10-39. Cleaning and servicing consists of cleaning the liferaft and containers and/or cases, checking hydrostatic test date on multiplace liferaft CO₂ cylinders, replacing the safety disc and washer on inflation valves, recharging CO₂ cylinders and safety-wiring inflation valves.

10-40. CLEANING OF LIFERAFTS. To clean liferafts, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791
		NIIN 00-282-9699
As Required	Cloth, Lint-Free, Type II	MIL-C-85043
		NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A
		NIIN 01-080-9589



Solvents are not to be used in the cleaning of liferafts.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.
2. Apply cleaning solution to soiled area with a spray or sponge.
3. Allow solution to remain on the surface for several minutes, then agitate with a soft brush or rag.
4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.
5. Dry liferaft with a lint-free cloth and apply a light coating of talc.

10-41. CLEANING OF CONTAINERS AND/OR CASES. Clean in accordance with [paragraph 10-40](#).

10-42. HYDROSTATIC TEST. Inspect CO₂ cylinders used on multiplace liferafts to determine if the previous hydrostatic test was within the last five years. However, a fully charged cylinder (charged to the cylinder gross weight) is considered serviceable, regardless of the last hydrostatic test date, until discharged. If over five year

due date for testing, and cylinder has been discharged, proceed with hydrostatic test:



Bottles should be turned in for testing as close to due date as possible. Extending hydrostatic testing by leaving bottle charged may result in corrosion build up on inside of cylinder, which may cause a malfunction during actuation.

Wire-wrapped cylinders must have wire-wrapping removed prior to hydrostatic testing; cylinders passing the hydrostatic test must be rewound prior to placing back in service.

Wire-wrapped cylinders must have letter W at end of part number. Cylinders received without the W at end of part number do not require wire-wrapping.

Materials Required		
Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
-or-		
1	Parts Kit, Valve	ASV710 (CAGE 34009) NIIN 00-999-7662

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man liferafts, have siphon tubes installed.

1. Disconnect the cylinder and valve assembly from the raft. Remove and retain valve for the replacement cylinder.
2. Mark appropriate form “Hydrostatic Test Required” in accordance with OPNAVINST 4790.2 Series and return old cylinder to Supply.

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man liferafts, have siphon tubes installed.

3. Obtain a replacement cylinder. Before installing valve on cylinder, gently tap inverted cylinder with a small piece of wood. If any rust or other contamination

falls from cylinder, do not use that cylinder; draw another cylinder and repeat contamination check.

4. Check for installation of siphon tube.

5. Replace stem in inflation assembly valve if necessary.

6. Install a new sealing washer.

7. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.

8. Charge cylinder and reconnect valve and cylinder to liferaft as appropriate.

10-43. REPLACEMENT OF INFLATION VALVE POPPET ASSEMBLY. If leakage of CO₂ is from valve discharge port, inspect the valve poppet (P/N ASV-601, NSN 4220-00-507-6667) for worn seat as follows:

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve from a charged CO₂ assembly.

Materials Required

Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
	-or-	
1	Parts Kit, Valve	ASV 710 (CAGE 34009) NIIN 00-999-7662
1	Valve Poppet Assembly	P/N ASV-601, NIIN 00-507-6667

1. Remove cylinder from liferaft.

2. Remove valve from cylinder.

3. Disassemble valve (Figure 10-7) and inspect poppet for worn seat. Replace poppet assembly if necessary.

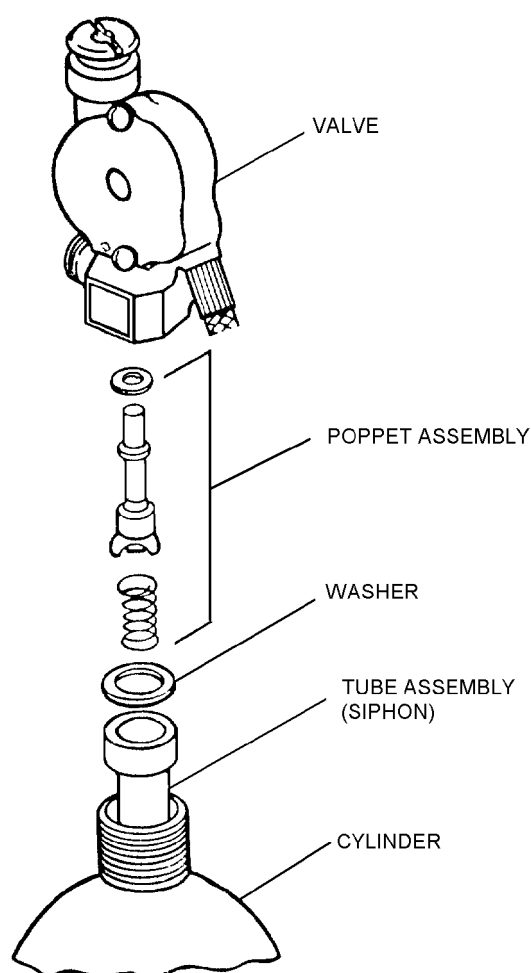
4. Install a new sealing washer.

5. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.

10-44. REPLACEMENT OF SAFETY DISC AND WASHER ON INFLATION VALVES. (See figure 10-8.) To replace safety disc and washer on inflation valve assemblies (A-128/871444) proceed as follows:

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve or valve safety disc plug from a charged CO₂ assembly.



10100007

Figure 10-7. Valve Poppet Disassembly

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque	—
1	Socket, 5/16 inch	—
1	Hex Stock, 5/16 x 2 inch Length	—

Materials Required

Quantity	Description	Reference Number
1	Repair Kit (Insert, Washer, Disc)	903684 (CAGE 33525) NIIN 00-703-7811

1. Remove cylinder from liferaft.
2. Remove safety disc plug; insert safety disc and washer.
3. Place new washer into inflation valve safety disc orifice.
4. Place new safety disc into inflation valve safety disc orifice.
5. Replace insert and safety disc plug.

NOTE

While tightening the safety disc plug, align insert with plug.

6. Tighten safety plug on A-128/871444 to 29 ft-lb of torque.

10-45. RECHARGING. To recharge the inflation assembly, proceed as follows (see figure 10-9):



When discharging partially charged or overcharged CO₂ cylinders, hold firmly in place with a suitable holding device (vice). Protect CO₂ cylinder from vice jaws with cloth or a suitable substitute. Position cylinders so escaping gas is not directed toward any personnel.

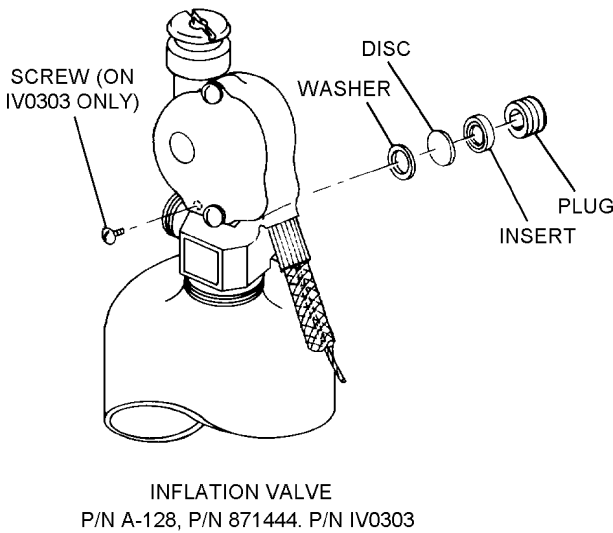


Figure 10-8. Disassembly of Inflation Valve Safety Disc Assembly

10100008

NOTE

Inspect CO₂ cylinders for multiplace life-rafts before recharging. Refer to [paragraph 10-32](#).

Charged inflation assemblies used as spare replacements shall be inspected in accordance with [paragraph 10-31](#) prior to raft installation.

To perform the following filling procedures it is necessary to ensure that CO₂ cylinder is completely discharged.

1. Remove inflation valve cover and rotate cam with screwdriver to open position.
2. Weigh and record tare weight (empty weight cylinder, valve and cable assembly) of inflation assembly. Correct tare weight marking on cylinder if necessary.

NOTE

Supply cylinders not equipped with siphon tube must be inverted during transfer operation. Inverting cylinder allows the liquid to flow from the valve. Supply cylinders with

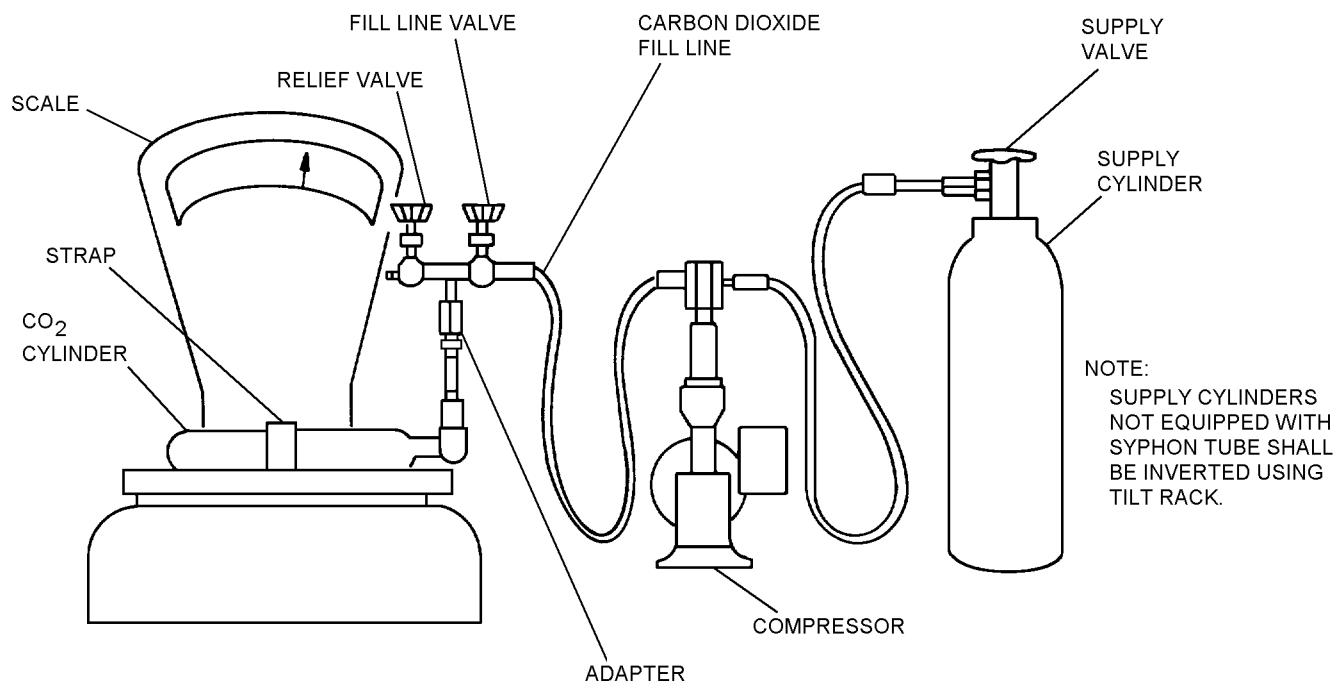


Figure 10-9. Recharging Schematic

10100009

siphon tube (straight pipe) extending from the valve to the bottom of the cylinder can be emptied in the vertical position.

3. Install proper charging adapter on inflation assembly.

4. Secure inflation assembly to weighing pan.

5. Open supply cylinder valve, fill line valve and relief valve to purge fill line. Close fill line valve and relief valve.

NOTE

Ensure fill line is free from contact with any object along entire distance from compressor to charging adapter. If fill line does not hang free, accurate weight readings cannot be obtained.

6. Connect fill line to inflation assembly and zero scale.

NOTE

Proper charge weight is 4.74 to 4.86 lbs.

7. Ensure inflation assembly valve is open.

8. Open fill line valve.

9. Allow carbon dioxide to cascade from supply cylinder into inflation assembly. If gross weight (tare weight plus 4.74 to 4.86 lbs) cannot be reached, start compressor and complete charging. Stop compressor upon reaching proper gross weight.

10. Close fill line valve.

11. Close inflation assembly valve. Open relief valve on fill line valve if applicable.

NAVAIR 13-1-6.1-1

12. Disconnect fill line from inflation assembly. Remove charging adapter.

13. Measure gross weight of charged inflation assembly.

14. If gross weight of inflation assembly is greater than required, carefully bleed off excess from inflation assembly. If gross weight is less than required, reinstall charging adapter and repeat steps 5 through 14.

15. Reinstall diffuser plug, if applicable.

NOTE

When other cylinders are to be recharged immediately, leave supply cylinder valve open.

16. Close supply and bleed system pressure.

NOTE

Remove cover plate on multiplace liferaft valve assemblies.

17. Immerse inflation assembly in water tank.

CAUTION

If inflation valve leaks from discharge port, inspect inflation valve poppet assembly in accordance with paragraph 10-43.

18. Check for leaks; then remove assembly from tank and dry with an air blast. Wipe assembly with a lint-free cloth.

NOTE

After storage period, inflation assembly should be checked for proper weight.

19. If required, re-mark tare weight, gross weight, charge weight on cylinder.

20. Safety-wire the assembly in accordance with paragraph 10-46.

10-46. SAFETY-WIRING. To safety-wire the inflation assembly, proceed as follows:

10-26 Change 1

Support Equipment Required

Quantity	Description	Reference Number
1	Torque Meter	—
1	Special Socket	—
1	Dial Push/Pull Gage	DPPH50 (CAGE 11710) NIIN 00-473-0108 or equivalent

WARNING

To ensure that proper safety wire is used on liferaft inflation assemblies, a tensile strength test shall be performed on a sample of wire from each spool intended for this use prior to using.

Materials Required

Quantity	Description	Reference Number
As Required	Wire, Aluminum, 0.032 inch Diameter, Temper 0	QQ-A-225/1 NIIN 00-595-8200
2	Screw, Brass	MS35273-2 NIIN 00-720-8657
2	Washer, Lock	MS35333-10 NIIN 00-011-5551
As Required	Seal, Lead	NIIN 00-598-3427
1	Pin, Steel	—

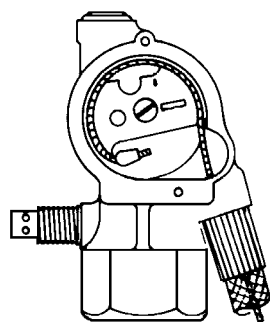
1. Secure one end of a 12-inch sample of aluminum wire (0.032-inch diameter) to a stationary support.

2. Attach opposite end to pull scale; then apply a pull force.

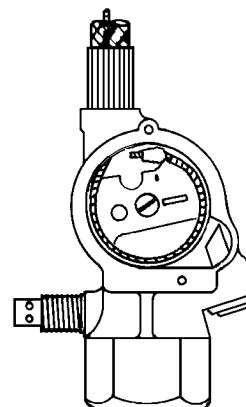
NOTE

Tensile strength of sample shall be 8 to 15 pounds.

3. Remove valve cover plate and ensure correct routing of pull cable. See figure 10-10.

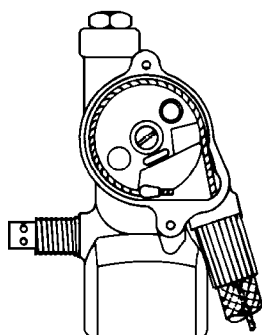


DOWN-PULL

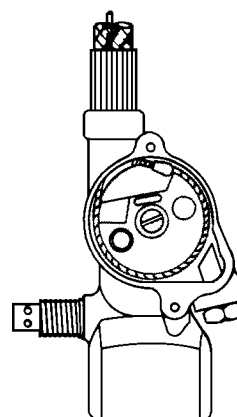


UP-PULL

P/N A128 INFLATION VALVE

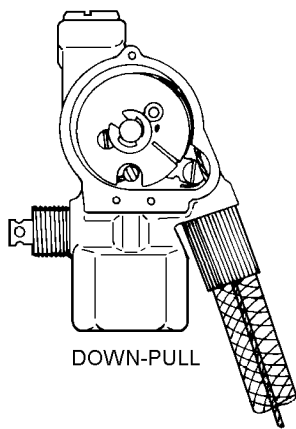


DOWN-PULL

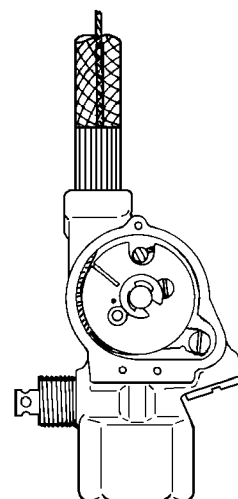


UP-PULL

P/N 871444 INFLATION VALVE



DOWN-PULL



UP-PULL

P/N IV0303 INFLATION VALVE

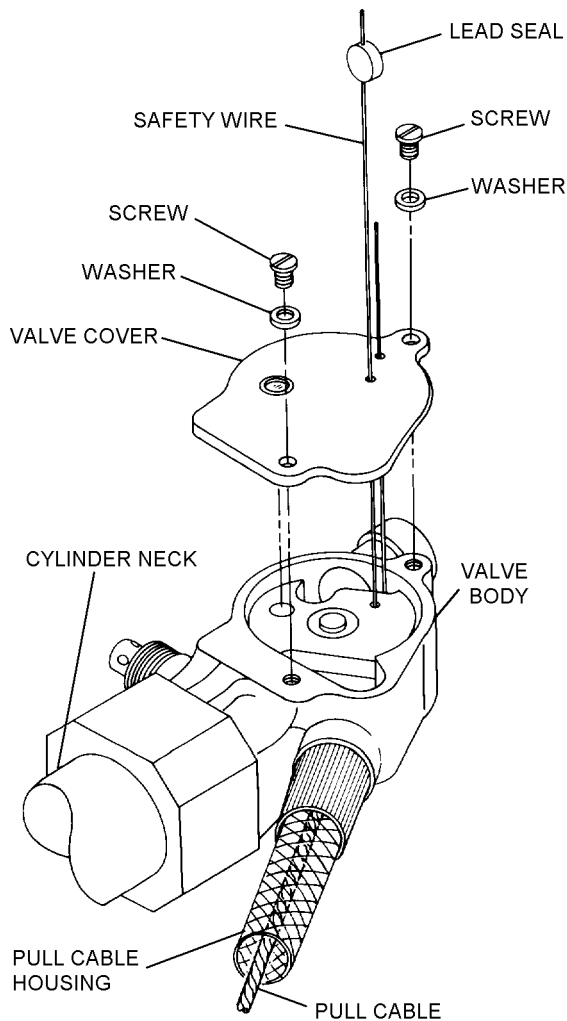
Figure 10-10. Routing of Multiplace Liferaft Pull Cable

10100010

NOTE

Ensure that pull cable used for multiplace liferafts has been proof load tested in accordance with [paragraph 10-23](#).

4. Route safety wire as shown. Use 0.032-inch diameter aluminum wire.



TYPICAL INSTALLATION OF SAFETY WIRE

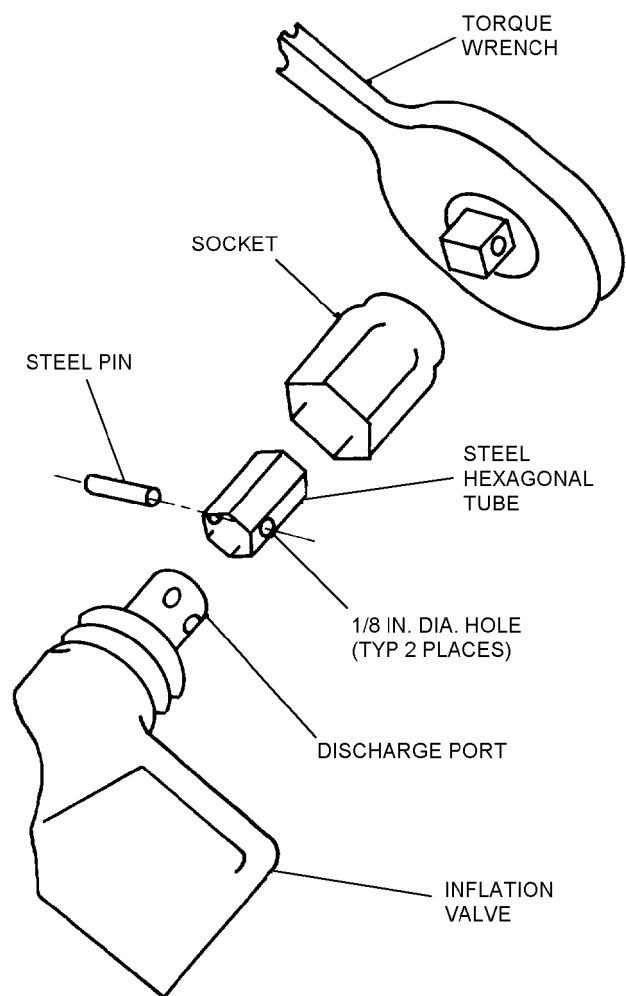
J0046004

Step 4 - Para 10-46

5. Replace valve cover. Twist ends of safety wire to achieve maximum tautness and crimp lead seal. Ensure that pull cable is properly installed. Green dot should be visible in valve cover window.

6. Examine inflation valve to ensure the presence of screw and lockwasher.

7. Tighten discharge port to a torque value of 60 ± 5 in-lb.



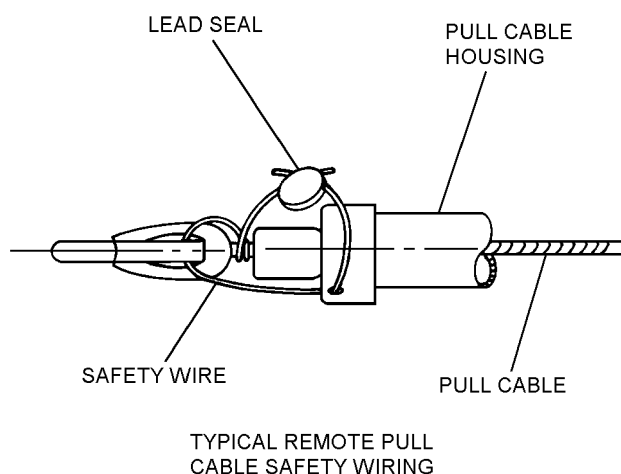
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Step 7 - Para 10-46

NOTE

Multiplace liferafts used in aircraft wing compartments shall be safety-wired according to applicable aircraft maintenance instructions.

8. Safety-wire pull cable to pull cable housing as shown. Use 0.032-inch diameter aluminum wire on all liferafts.



J0046008

Step 8 - Para 10-46

9. If inflation assembly is to be stored, attach a red tag with the following instructions printed in ink: **WARNING: WEIGH INFLATION ASSEMBLY BEFORE INSTALLING ON LIFERAFT. DO NOT INSTALL IMPROPERLY CHARGED CYLINDER OR IMPROPERLY SAFETY-WIRED INFLATION VALVE.**

10-47. REPAIR/REPLACEMENT.

10-48. This section contains instructions for the repair or replacement of various components or subassemblies of the LRU-14/A liferaft to ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for minor parts which are defective, corroded or worn and require replacement are included in the applicable paragraph of this section. Otherwise, refer to [Section 10-4](#). All repairs shall be documented by making necessary entries on ap-

propriate form in accordance with OPNAVINST 4790.2 Series.

10-49. Replacement of easily removed assembly components such as CO₂ inflation valves are authorized in addition to repair and replacement procedures documented in this section. The liferaft shall be subjected to a functional and leakage test each time CO₂ inflation valves are removed and replaced for any reason, and each time inflation valve gaskets are replaced.

10-50. DETERMINATION OF REPAIRABILITY.

Liferafts shall be considered beyond repair for any of the following reasons:

1. Porous fabric areas on tubes.
2. Split or open tube seams.
3. Leakage test failure resulting from other than cut, tear, or puncture.
4. Damaged, malfunctioning, excessively worn, or corroded inlet valve, manifold assembly or oral inflation tube, as applicable.
5. Damaged, malfunctioning, or excessively corroded topping-off valve that cannot be corrected by replacement of topping-off valve opening insert and washer.
6. Leaky bulkheads.
7. Extensively damaged floor.
8. Oral inflation or inlet valve stem separating from the liferaft fabric.
9. Deterioration of the rubberized fabric caused by oil, grease, or any other foreign substance.
10. Deterioration of the rubberized fabric caused by a heavy mildewed condition.
11. Opening of air retaining seams for internal repair.
12. Rips, tears, or punctures in the pneumatic compartments which exceed 2 inches.
13. In the judgement of a competent inspector, requiring excessive repair.

10-51. CEMENTING LIFERAFTS. All cementing of liferafts shall be performed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620

Materials Required

Quantity	Description	Reference Number
1	Disposable Brush	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone, (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Do not use toluene or MEK near open flames, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-14 Liferaft assemblies.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Toluene or MEK must be applied vigorously to liferaft material over three years old in order to reactivate the material prior to cementing. Pigment from the material coloring staining a cloth rubbed over the treated surface will indicate the material has been reactivated. Adhesive shall be applied immediately after the surface has dried.

1. Clean both surfaces to be cemented with four applications of toluene or MEK. Apply toluene or MEK with back-and-forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow areas to dry between applications.
2. Prepare cement and accelerator mixture. Prepare only enough mixture for 8 hours, as this is the effective active period for the mixture. Dispose of any remaining mixture at this time.
3. Using a disposable brush, apply adhesive to completely cover surfaces to be cemented. Use long one-directional strokes and complete each surface before adhesive becomes tacky as the brush may pull tacky adhesive from the surface. Allow to dry for ten minutes.
4. Apply a second coat of adhesive as in [step 3](#). Use brush strokes perpendicular to the original direction.
5. When second coat of adhesive has become tacky, place pieces together. If cemented area is a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden roller.
6. Allow adhesive to cure a minimum of 48 hours.
7. Dust area with talc.

10-52. PATCHING LIFERAFTS. To patch inflatable survival equipment, select color to approximately match item to be patched, and proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
	-or-	

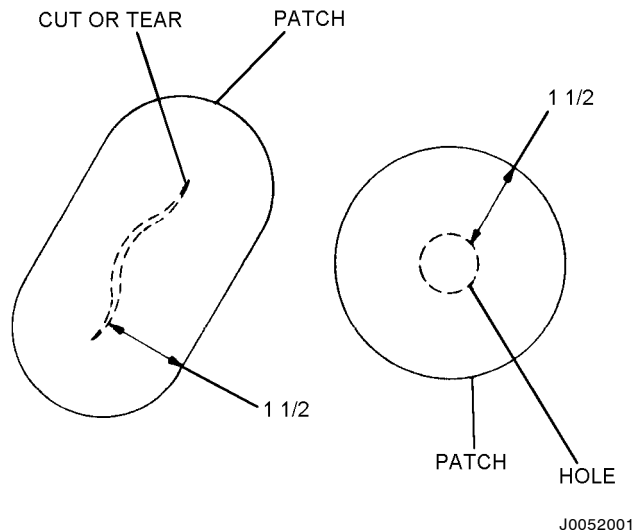
Materials Required (Cont)

Quantity	Description	Reference Number
As Required	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489



Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-14 Liferaft assemblies.

1. Cut a rounded patch 1 1/2 inches larger than the damage on all sides.



Step 1 - Para 10-52

2. Scallop edges of patch if it is larger than 5 inches in diameter.
3. If damaged area in floor is larger than 1 inch, patches shall be applied to both sides.
4. Center patch over damage and trace on outline of patch on fabric.

5. Cement patch to damaged area in accordance with [paragraph 10-51](#).

6. Dust area with talc.

7. Perform a leakage test.

10-53. RECEMENTING OR REPLACING SEAM TAPES. This repair shall be performed only if a flotation tube does not leak, that is, if only the outer seam tape is loose, or if the seam does not seal a flotation tube. To recement or replace a seam tape, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Toluene	TT-T-548 NIIN 00-281-2002
-or-		
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589

NOTE

Seam separation in floors and seats may be repaired provided safety and flotation capabilities are not compromised. Exercise sound judgement in determining whether such repairs are within local capabilities. All cementing shall be performed in accordance with [paragraph 10-51](#).

1. If tape is present and undamaged, recement tape to liferaft.

2. If tape is missing, measure and fit a replacement tape to area and cement in place. Overlap other seams a minimum of 1 inch.

WARNING

Do not use toluene or MEK near open flame, heat, or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Avoid excessive application of toluene or MEK on seams. Remove any spilled or excessive toluene or MEK immediately.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

3. If tape is damaged, peel damaged tape from liferaft. Apply toluene or MEK only as needed to loosen tape. Trim damaged tape and replace with new tape. Overlap other seam tape a minimum of 1 inch.

4. Perform leakage test.

10-54. SEA ANCHOR/MOORING LINE REPLACEMENT. To replace worn or damaged sea anchor or mooring line, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
1	Sea Anchor, Type I, Size 2	MIL-A-3339
As Required	Cord, Nylon Type III	MIL-C-5040 NIIN 00-240-2146

1. (Complete Assembly Replacement) Secure free end of mooring line to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

2. (Mooring Line Replacement Only) Sear both ends of a 26-foot length of MIL-C-5040 Type III nylon cord. Secure one end to sea anchor bridle, and other end to sea anchor mooring patch on liferaft with bowline knot followed by an overhand knot.

10-55. INSPECTION RECORD PATCH.

NOTE

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life-rafts. The requirement for all other record documentation remains unchanged. The reason for this change is that most Inspection Record Patches are unreadable, and the packer's and inspector's names, including the type of inspection (leak/functional), are documented on Aviation Crew Systems Records.

10-56. ADDITION OF INTERNATIONAL MORSE CODE PATCH. To fabricate and install an International Morse Code patch, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
8 x 5 inches	Cloth, Nylon, Var. C, Rubber-Coated, Orange	MIL-C-23070 NIIN 00-926-6489
As Required	Ink, Black Waterproof	SPE-92 NIIN 00-161-4229

1. Letter markings (see figure 10-12) on uncoated side of patch using black waterproof ink.

Figure 10-11. Deleted

NOTE

If replacing a worn or abraded International Morse Code patch, a new International Morse Code patch shall be cemented directly on top of old patch.

2. Mark a 8 x 5-inch area at location stated in tables 10-3 and 10-5, and shown in figure 10-4.

NOTE

Cement applications shall performed in accordance with paragraph 10-51.

3. Cement International Morse Code patch to marked area on liferaft so that top is up and patch is readable from inside raft.

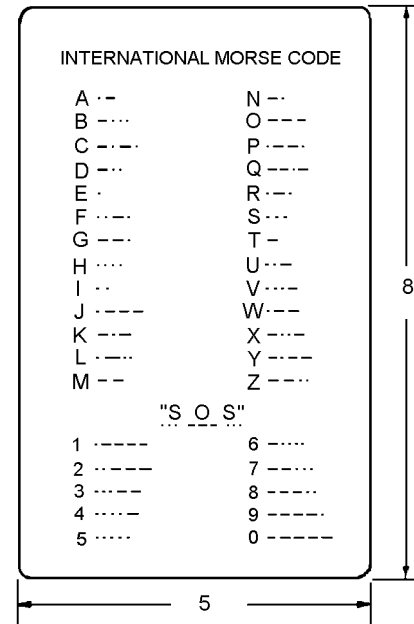


Figure 10-12. International Morse Code Patch

10100012

10-57. REPLACEMENT OF LOCKING CONES (LIFERAFT CASES). To replace damaged locking cones on liferaft cases, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nylon 3-Cord	V-T-295
As Required	Cone, Locking	NIIN 00-095-0075-LX

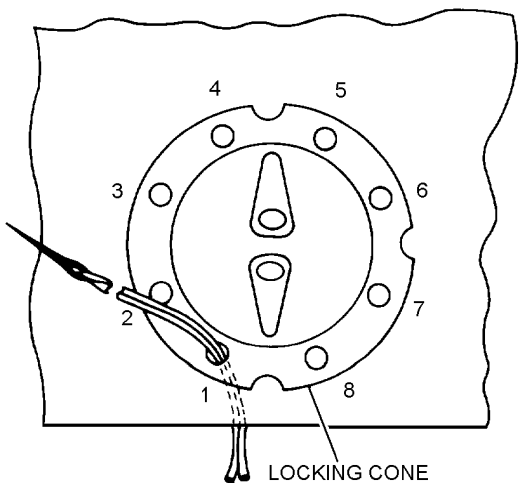
1. Cut and remove tacking holding damaged cone to life raft case. Remove damaged cone.

NOTE

If fabric supporting locking cone is damaged, fabricate and install a reinforcing patch on inside of case.

2. Position new locking cone in exact location of damaged or missing cone. Ensure locking pin hole in apex of cone is properly aligned.

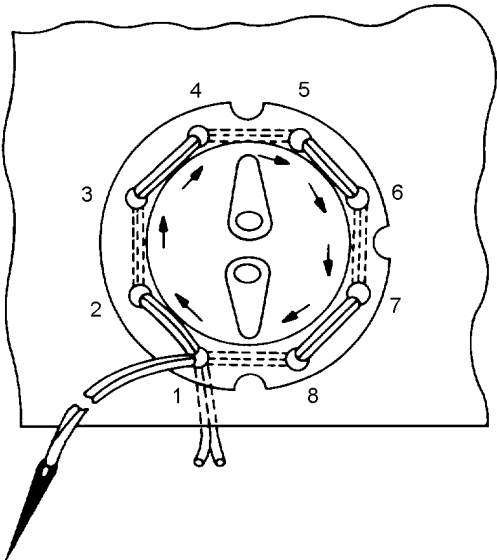
3. Push needle, threaded with waxed nylon 3-cord (V-T-295) doubled, up through panel and through hole 1 in locking cone. Pull needle and thread through hole until approximately three inches of thread remains on underside of panel.



Step 3 - Para 10-57

J0057003

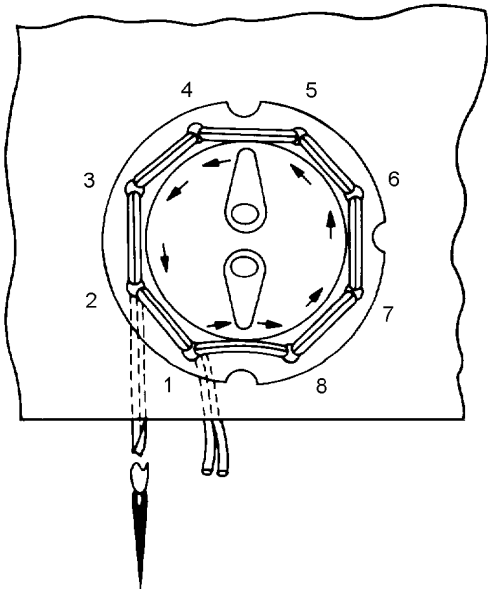
4. Working clockwise, pass needle down through hole 2, up through hole 3. Continue until all holes are threaded, and needle passes up through hole 1. Take up all slack in thread.



Step 4 - Para 10-57

J0057004

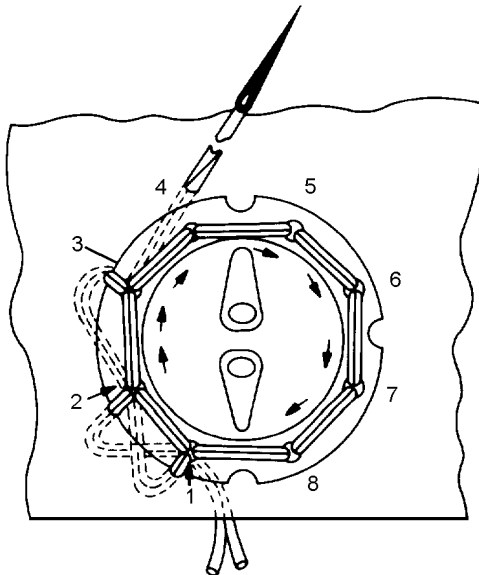
5. Working counterclockwise, pass needle down through hole 8, up through hole 7. Continue until needle passes down through hole 2. Take up all slack in thread.



Step 5 - Para 10-57

J0057005

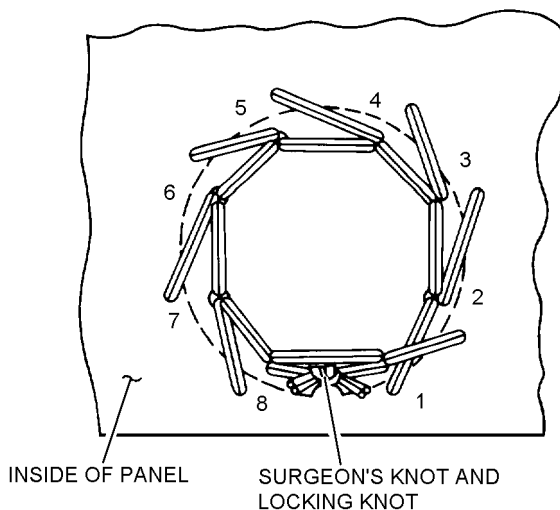
6. Pass needle up through panel at outside edge of cone directly adjacent to hole 1. Working clockwise, pass needle down through hole 1 and up through panel adjacent to hole 2, then down through hole 2. Continue stitching in this manner until needle passes down through hole 8. Take up all slack in thread.



Step 6 - Para 10-57

J0057006

7. Tie ends of thread on inside of panel with surgeon's knot followed by a square knot. Trim thread ends 1/4 inch from knot.



Step 7 - Para 10-57

J0057007

10-58. RELOCATION OF RETAINING LINE INSTRUCTION TAG. To relocate retaining line instruction tag, proceed as follows:

Materials Required

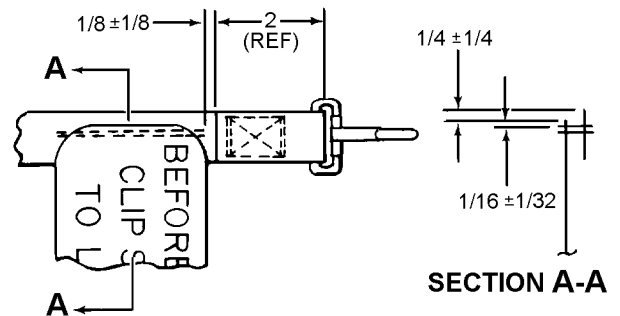
Quantity	Description	Reference Number
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

1. Remove the instruction tag from the snaphook.

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

2. Position instruction tag on retaining line and attach using two rows of stitches.



Step 2 - Para 10-58

J0058002

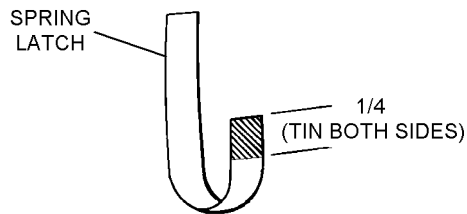
10-59. SOLDERING OF SNAPHOOK SPRING LATCH ON REMOTE ACTUATOR ASSEMBLY. To solder the snaphook spring latch used on remote actuator assemblies, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Solder, Type AR	QQ-S-571

1. Remove pull cable from remote actuator assembly.
2. Remove spring latch from snaphook.

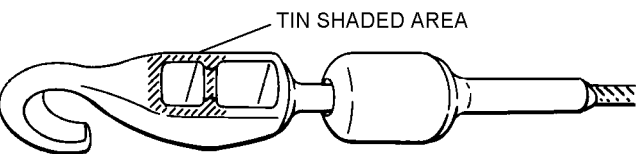
3. Using soft solder, tin both sides of spring latch 1/4 inch from end of hook.



Step 3 - Para 10-59

J0059003

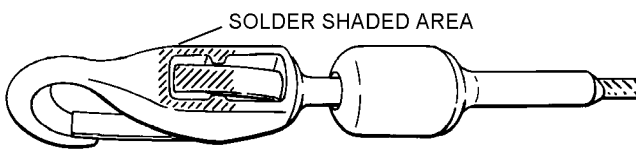
4. Using soft solder, tin snaphook.



Step 4 - Para 10-59

J0059004

5. Reinsert spring latch into snaphook and soft solder, securing spring latch in place.



Step 5 - Para 10-59

J0059005

6. Subject entire pull cable to a 50-lb pull test.

10-60. FABRICATION OF PAINTER LINE POUCH. Painter lines shall be installed on all multi-place liferafts. To fabricate the painter line pouch, proceed as follows:

Materials Required

Quantity	Description	Reference Number
5 x 20 inches	Leatherette, Class 2 or Herculite No. 80, Grey	CCC-A-700
53 inches	Tape, Pile, 3/4 inch	MIL-F-21840
41 inches	Tape, Hook, 3/4 inch	MIL-F-21840
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
1	Snaphook, Wire Body, Fixed Loop Eye, Flat Spring Closure, With Retainer	MIL-S-43770/ 1-CWBC1
60 feet	Cord, Nylon, Type I	MIL-C-5040 NIIN 00-240-2154

NOTE

All stitching shall be done with size E nylon thread (V-T-295, Type II), using 8 to 10 stitches per inch.

1. Cut and stitch hook and pile tape along edge of material. See [figure 10-13](#).

2. Stitch two 9-inch lengths of hook tape 1 1/4 inch from sides. See [figure 10-13](#).

NOTE

Stitch pile tape on one end only.

3. Position face up a 15-inch length of pile tape at inner end of each inside strip of hook tape. Secure inner end of each pile tape to material with double row of stitching. See [figure 10-13](#).

NAVAIR 13-1-6.1-1

- 2. Remove cover plate and plastic dust shield from valve.
- 3. Using a no. 52 drill, drill two holes in cover plate and plastic dust shield. See figure 10-15.
- 4. Remove cam screw from sheave assembly.

WARNING

Care must be taken not to rotate cam.

- 5. Remove sheave assembly.
- 6. Carefully remove tru-arc ring from stem on valve body.
- 7. Remove valve sheave from valve body.
- 8. Using a no. 52 drill, drill a hole at a 60° angle in valve sheave. See figure 10-15.

NOTE

Section line B-B through the center of the screwdriver slot and the center of the screw hole. A starter hole will be necessary to seat the drill, prior to drilling the angled hole.

CAUTION

Valve cover plate is not interchangeable between manufacturers.

- 9. Install valve sheave, tru-arc ring, release cable, cam screw, plastic dust shield, and cover plate. See paragraph 10-46 for proper safety-wiring.
- 10. Connect inflation valve to manifold.

10-63. DRILLING HOLES IN P/N A128 INFLATION VALVE. To drill holes in P/N A128 inflation valve, proceed as follows:

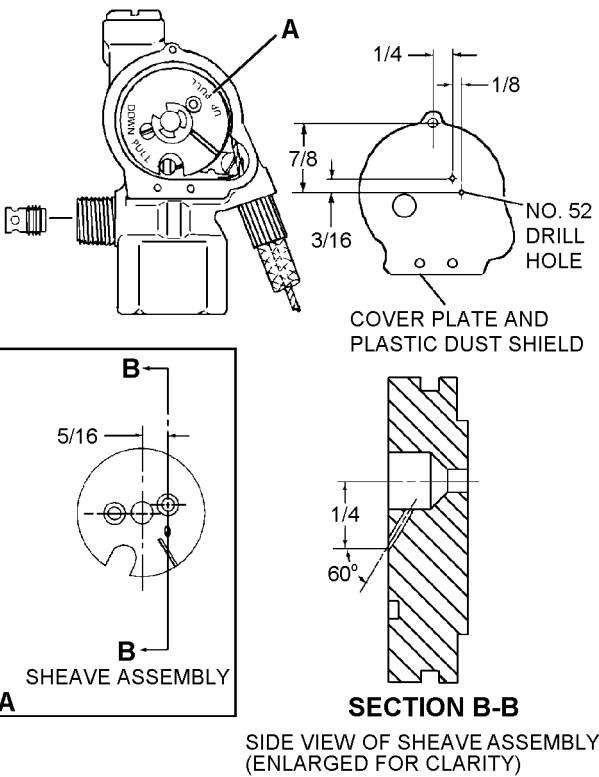


Figure 10-15. Drilling IV0303 Inflation Valve

10100015

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

- 1. Disconnect inflation valve from manifold.
- 2. Remove cover plate from valve.
- 3. Using a no. 52 drill, drill two holes in cover plate. See figure 10-16.
- 4. Remove release cable from around valve.

WARNING

Do not rotate cam or depress poppet stem.

5. Remove valve sheave from valve.
6. Using a no. 52 drill, drill a hole at a 23° angle in the valve sheave. See [figure 10-16](#).
7. Install valve sheave, cable, and cover plate. See [paragraph 10-46](#) for proper safety-wiring.
8. Connect the inflation valve to manifold.

10-64. DRILLING HOLES IN P/N 871444 INFLATION VALVE. To drill holes in part number 871444 inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.
2. Remove cover plate from valve.

NOTE

Position of holes depends on type of pull used (up-pull or down-pull).

3. Using a no. 52 drill, drill two holes in cover plate. See [figure 10-17](#).
4. Remove release cable from around valve sheave.

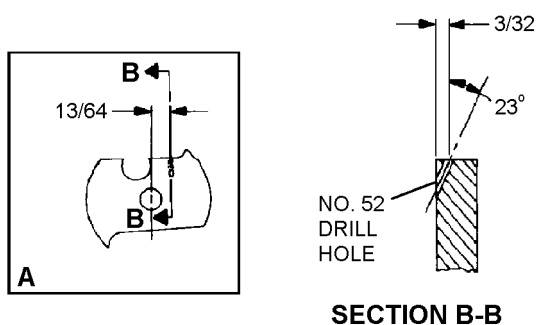
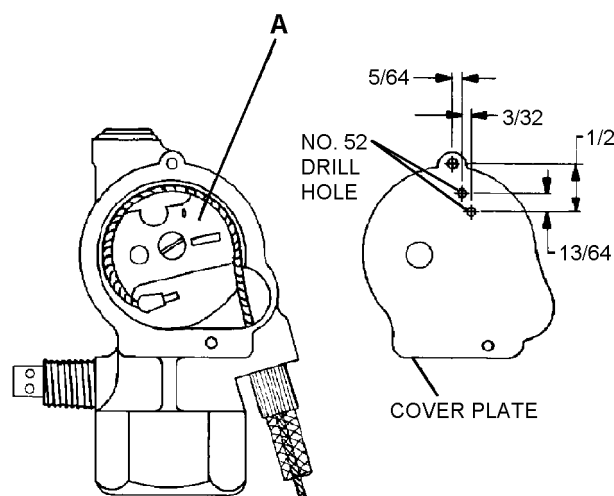


Figure 10-16. Drilling A128 Inflation Valve

10100016

WARNING

Do not rotate cam or depress poppet stem.

5. Remove valve sheave from valve.
6. Using a no. 52 drill, drill a hole at a 18° angle in valve sheave. See [figure 10-17](#).
7. Install valve sheave, cable and cover plate. See [paragraph 10-46](#) for proper safety-wiring.
8. Connect inflation valve to manifold.

10-65. FABRICATION OF CYLINDER VALVE ANTI-CHAFING SLEEVE. To fabricate a cylinder valve antichafing sleeve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Punch, Cutting, Type I, Class B, Style 1, Size 13	GGG-P-833A NIIN 00-180-0927

Materials Required

Quantity	Description	Reference Number
16 1/2 x 8 1/2 inches	Cloth, Laminated Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
-or-	Cloth, Laminated Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
-or-	Cloth, Laminated Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

1. Make two folds in the nylon rubber-coated cloth, each fold being 5 1/2 inches as shown.

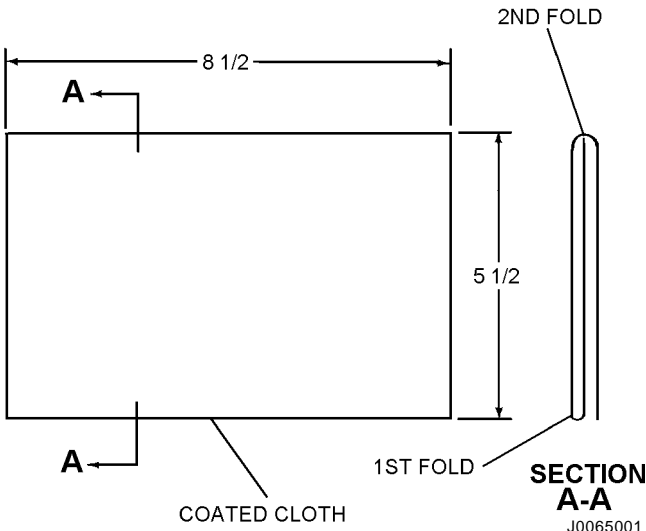
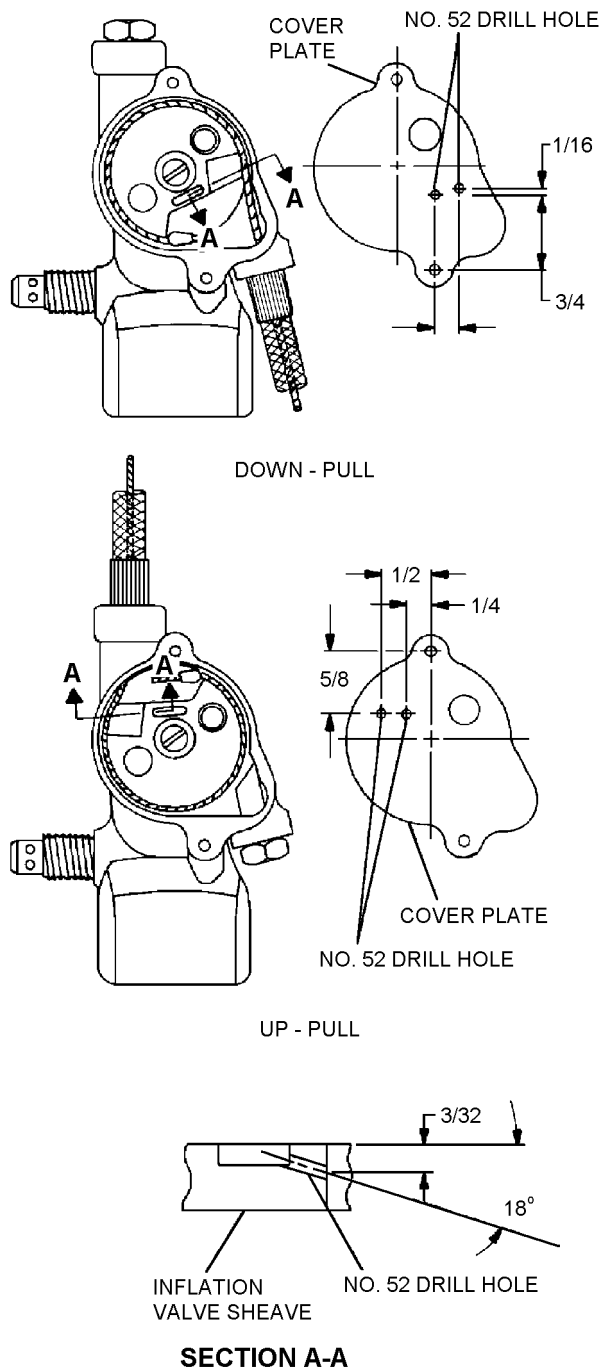
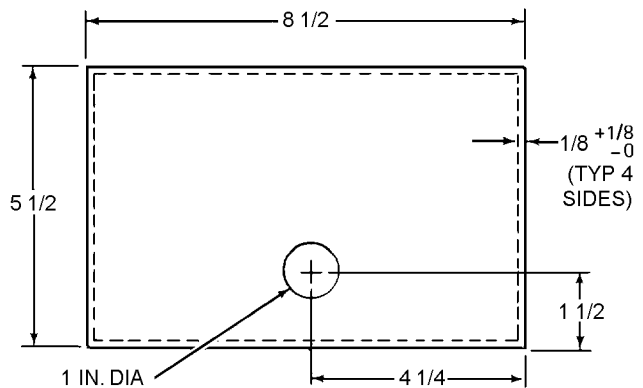


Figure 10-17. Drilling 871444 Inflation Valve

Step 1 - Para 10-65

2. Sew a 1/8-inch inboard border row of stitching around the perimeter of the assembly.

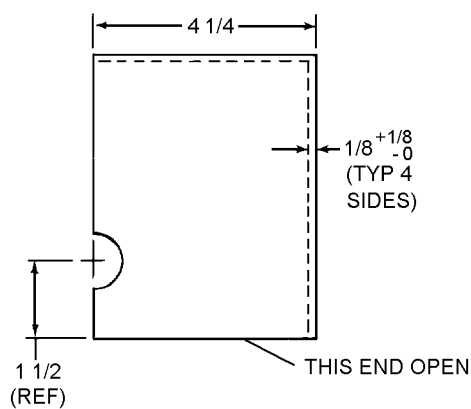
3. Position assembly on cutting board and punch a 1-inch diameter hole through all three layers of material.



J0065003

Step 3 - Para 10-65

4. Fold assembly in half and sew a 1/8-inch row of stitching inboard from edge on end and side.



J0065004

Step 4 - Para 10-65

10-66. FABRICATION OF 10-FOOT RETAINING LINE. To fabricate a 10-foot retaining line, proceed as follows (see [figure 10-18](#)):

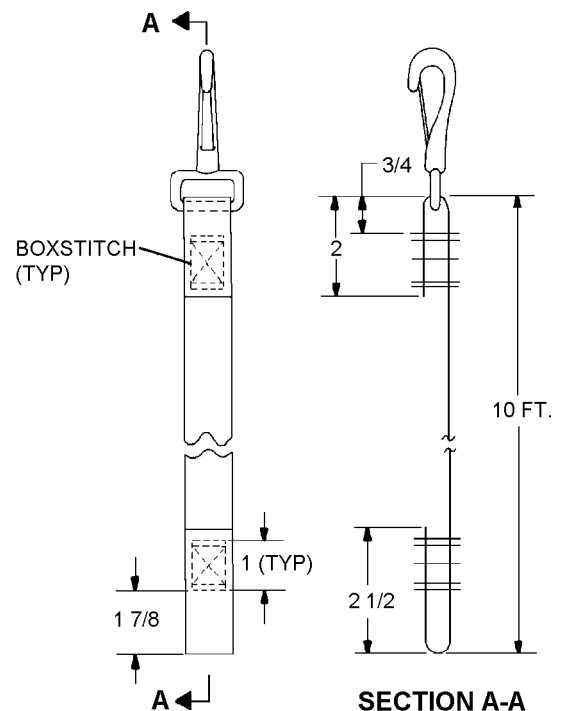
Materials Required

Quantity	Description	Reference Number
10 feet 4 1/2 inches	Webbing, Nylon, Type II, 1 inch	MIL-W-4088
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
1	Snaphook	M43770/1-CWBC3

1. Using dimensions shown, pass one end of nylon webbing through snaphook and boxstitch.

2. Using dimensions shown, fold opposite end over and boxstitch, forming a loop.

10-67. FABRICATION OF RIGHTING LINE. To fabricate the righting line, proceed as follows:



10100018

Figure 10-18. 10-Foot Retaining Line

NAVAIR 13-1-6.1-1

Materials Required

Quantity	Description	Reference Number
12 feet	Rope, Nylon, Type I, 3/4 inch Circumference, Natural Color	MIL-R-17343 NIIN 00-618-0261

1. Securely tie righting line to liferaft lifeline with a bowline knot on port side opposite manifold (mid-way between the two lifeline patches). See [figure 10-4](#).

2. Tie two overhand knots, the first knot 1 foot from the free end and the second knot 1 foot from the first. The finished length of the knotted righting line shall be 10 feet 6 inches ±6 inches. To avoid fraying, sear all cut edges. Do not form sharp edges.

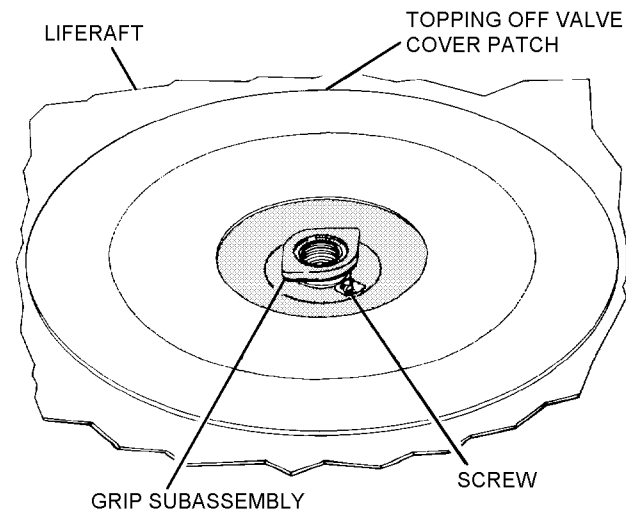
10-68. REPLACEMENT OF TOPPING-OFF VALVE. To replace a damaged or corroded topping-off valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Grip Subassembly (See Note)	MS22054-3
1	Washer (See Note)	MS22054-7
1	Screw (See Note)	MS22054-9
As Required	Applicator, Wood, Cotton-tipped	GGA-616D
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913

Note: This component is part of parts kit, P/N 1106AS110-1 (CAGE 30003) NIIN 01-128-5331.

1. Ensure that grip subassembly is in closed position.

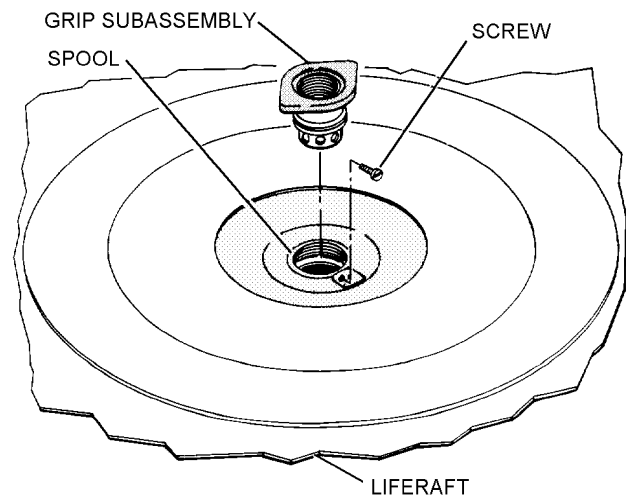


J0068001

Step 1 - Para 10-68

2. Turn grip subassembly clockwise approximately 1 1/2 turns.

3. Remove screw from side of spool.



J0068003

Step 3 - Para 10-68

4. Unscrew and remove grip subassembly from spool.

WARNING

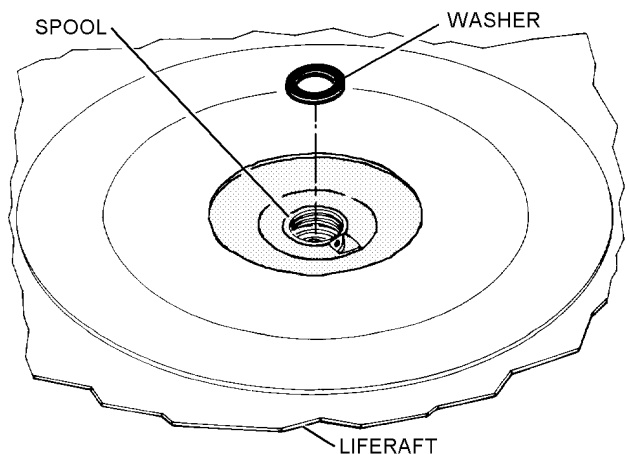
Do not use toluene or MEK near open flame, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.

CAUTION

To avoid damaging valve threads, care should be taken when inserting instrument to remove washer.

Use only enough toluene to loosen washer. Ensure that no toluene or MEK passes through bottom of valve opening. Wipe excess from liferaft as rapidly as possible.

5. Remove washer located in bottom of spool. If necessary, use toluene or MEK to assist in removal.



J0068005

Step 5 - Para 10-68

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Ensure that no toluene, MEK, or congealed masses of adhesive enter the opening at the bottom of the spool.

6. Insert an applicator or similar instrument dipped in toluene or MEK into spool and swab washer seating area to remove old adhesive.
7. Apply adhesive, using an applicator or similar instrument, to washer seating area on inside bottom of spool.

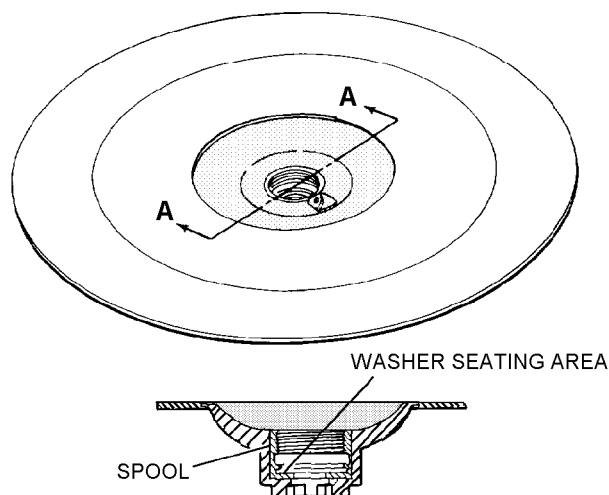
CAUTION

Do not use sharp instrument to insert washer into seating area.

NOTE

Ensure that the washer is properly seated onto bottom of spool and that the threads and opening are free of adhesive.

8. Insert washer into washer seating area.



J0068008

Step 8 - Para 10-68

9. Screw grip subassembly counterclockwise into spool until it closes.
10. Turn grip subassembly clockwise approximately 1 1/2 turns.

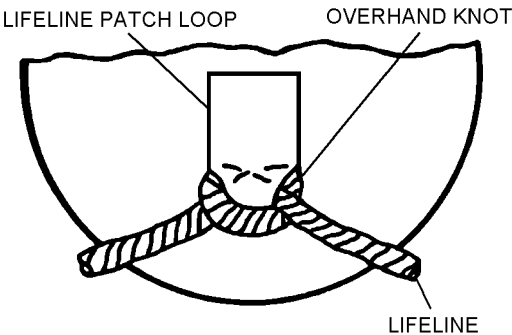
NAVAIR 13-1-6.1-1

- 11. Tighten screw into side of spool till snug.
- 12. Ensure proper operation of topping-off valve.
- 13. Perform leakage test.

10-69. REPLACEMENT/REPAIR OF LIFELINE.
To replace or repair the lifeline proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Rope, Nylon, 3/4 inch circumference, Natural Color	MIL-R-17343 NIIN 00-618-0261
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

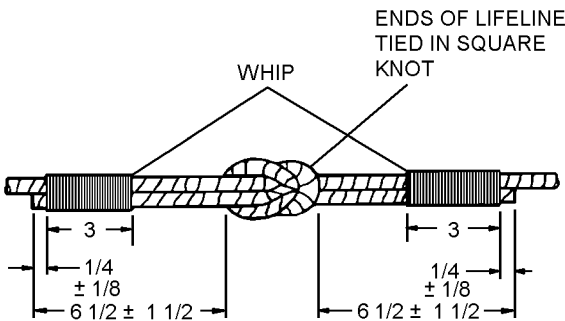
- 1. Inflate raft to test pressure.
- 2. Carefully remove damaged lifeline from all life-line patch loops (overhand knot) and from righting line (bowline knot).
- 3. Thread nylon cord through all lifeline patch loops, tying an overhand knot around each loop. Leave 2 inches \pm 1 inches slack in lifeline between each lifeline patch loop.



Step 3 - Para 10-69

J0069003

- 4. Secure ends of lifeline with a square knot mid-way between lifeline patch loops leaving 6 1/2 inches \pm 1 1/2 inches on each end of lifeline outside of knot.
- 5. Wrap (whip) the last 3 inches of 6 1/2 inch loose ends with Type II size E nylon thread to secured lifeline. A length of 1/4 inch \pm 1/8 inch of bitter end will extend beyond the whip.



J0069005

Steps 4 and 5 - Para 10-69

- 6. Secure righting line to lifeline with bowline knot (Refer to [paragraph 10-67](#)).

10-70. REPLACEMENT OF LIFERAFT HEAVING LINE.
To replace liferaft heaving line proceed as follows:

Materials Required		
Quantity	Description	Reference Number
75 feet	Cord, Nylon, Coreless Type I, 400 lb Test	MIL-C-7515

- 1. If required, untie bowline knot and remove defective heaving line from attachment loop in heaving line pocket on main tube of liferaft.
- 2. Using bowline knot secure one end of replacement line to attachment loop in heaving line pocket.

3. Secure heaving line grommet to opposite end of heaving line using bowline knot.

4. Fake heaving line on flat surface using into 13-inch bights. Gather the line and place rubberband around each end one to two inches from end of bights.

5. Place heaving line in heaving line pocket under grommet. Close pocket and secure snaps.

10-70A. REPAIR OF LIFERAFT CARRYING CASE. To repair the liferaft carrying case, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Thread, Nylon, Size E, Type I or II	V-T-295
As Required	Cloth, Laminated Var. C, Orange	MIL-C-23070 NIIN 00-081-5829

1. Tears of less than 1 inch shall be darned or repaired with a zigzag stitch.

2. Tears of 1 to 6 inches shall be covered with a patch.

3. Broken stitching shall be repaired by overstitching 2 inches past the ends of the broken stitches and shall be back-stitched 1 inch.

4. Tears of over 6 inches shall not be repaired.

10-71. PACKING LRU-14 SERIES LIFERAFT.

10-72. The LRU-14 series liferaft assemblies may be packed in droppable configurations (hand-launched) for downpull or for installation in aircraft liferaft compartments. The LRU-14 series shall be packed by qualified personnel at the lowest level of maintenance possible. For cleaning and servicing instructions, refer to [paragraph 10-38](#).

10-73. PACKING PROCEDURE FOR LRU-14 SERIES LIFERAFT ASSEMBLY (DROPPABLE). To pack an LRU-14 series liferaft assembly (droppable), proceed as follows:

1. Ensure that liferaft, carrying case, and accessory container have been inspected in accordance with [paragraph 10-13](#).

2. Ensure that survival items and liferaft accessories have been inspected for expiration and damage. Refer to [table 10-7](#) for items used.

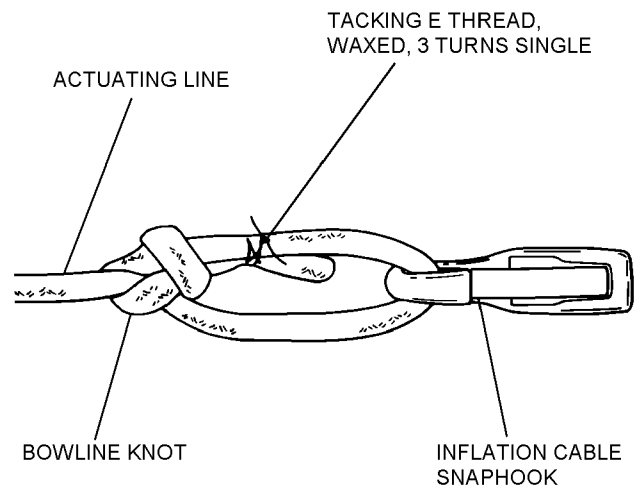
NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modification to the survival items.

3. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap (NIIN 00-142-9008) and secure with rubber bands. Stow survival items in accessory container and supply pocket. Tie hand pump, installed radio(s), and Manual Reverse Osmosis Desalinator (MROD) to accessory container grommet with a 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

4. Ensure that inflation valve is routed for down-pull. See [figure 10-10](#).

5. Attach a 42-inch actuating line, nylon cord, Type III (MIL-C-5040) to inflation assembly snap-hook with a bowline knot. Tack with three turns of waxed size E nylon thread, single. Tie off tacking with a surgeon's knot followed by a square knot.



J0073005

Step 5 - Para 10-73

WARNING

Wrap only the snaphook. Tape which extends to the pull cable housing will impede actuation of the liferaft inflation assembly.

6. Wrap pull cable snaphook with a layer of wide paper tape to prevent snaphook from hanging up on case after connection.

NAVAIR 13-1-6.1-1

7. Attach retaining line to neck of CO₂ cylinder with a lark's head knot.

8. Ensure that cylinder valve antichafing sleeve is installed.

9. Fake retaining line, righting line, and sea anchor mooring line, and secure with rubber bands.

10. If heaving lines are installed, stow heaving lines in heaving line pockets as follows:

a. Secure the loose end of the heaving line to the loop in the bottom of the heaving line pocket with a bowline knot.

b. Remove all twists and tangles from heaving line and grommet.

c. Fake the heaving line in 11 to 13-inch bights on a flat surface, starting 12 to 15 inches from the loop in the bottom of the heaving line pocket.

d. Continue faking until 15 to 21 inches of line remains, measured from last bight of line to grommet.

e. Gather the heaving line and place a doubled 2-inch rubber band over the heaving line 1 to 2 inches from each end of the bights.

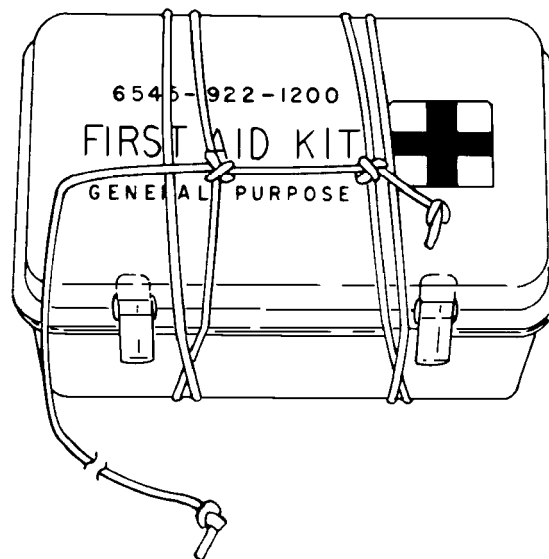
f. Place the heaving line under the grommet in the heaving line pocket and close the pocket.

NOTE

Ensure all items listed in [table 10-7](#) are stowed in accessory container including canopy ribs, bailing buckets and oars, if applicable.

11. Ensure that all topping-off valves are closed and liferaft is completely deflated.

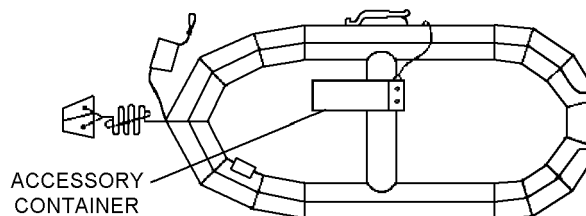
12. Secure latches on first aid kit with several layers of pressure-sensitive tape (NIIN 00-266- 5016). Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container grommet and secure with a bowline knot. Stow first aid kit in accessory container.



J0073012

Step 12 - Para 10-73

13. Stow accessory container in liferaft using a 10-foot length of type III nylon cord, tie to nearest lifeline loop located next to CO₂ cylinder with a bowline knot.



J0073013

Step 13 - Para 10-73

14. Secure supply pocket to mating snap fasteners on raft bulkhead. Ensure slider pull tab on supply pocket is tied to nearest lifeline loop with a 60-inch length of Type III nylon cord using bowline knots on both ends.

NOTE

Painter lines shall be installed on all multi-place liferafts. The painter line shall be a 60-foot length of Nylon cord, Type I (MIL-C-5040, NIIN 00-240-2154). The painter line retains a deployed liferaft to the aircraft during emergency egress and is designed to break under a 100-pound pull if the aircraft sinks.

15. Stow painter line in painter line pouch by forming eight 3 1/2-inch bights in line; and inserting each bight in eight hesitator loops provided. Leave 30 inches of unstowed painter line at each end of pouch. See [figure 10-19](#). Close pouch; then secure with hook and pile tape provided.

16. Attach snaphook to end of unstowed painter

line extending from open end of pouch with a bowline knot. See [figure 10-19](#).

17. Attach end of painter line without snaphook to sea anchor mooring patch loop with a bowline knot.

18. Dust entire liferaft lightly with talc (MIL-T-50036A).

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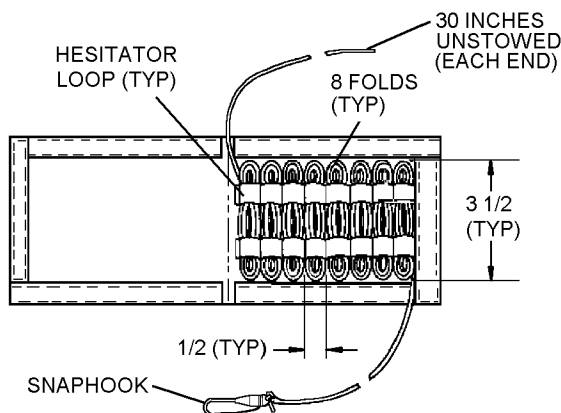


Figure 10-19. Stowed Painter Line

10100019

WARNING

To prevent malfunction during inflation, ensure that no lifeline, painter line, sea anchor mooring line, righting line, or retaining line entangles or loops liferaft hardware during folding and packing procedures.

NOTE

Ensure canopy is rolled and secured to upper tube before folding liferaft.

19. Fold liferaft in accordance with figure 10-20. Ensure that sea anchor is placed on top of folded liferaft and actuating cord extends from folded liferaft.

20. Insert rolled liferaft into carrying case so that pull cable housing and attached actuating line are positioned toward carrying case ripcord handle end flap.

21. Stow painter line pouch behind carrying case end flap opposite from ripcord handle end of container; then attach painter line snaphook to end flap carrying handle.

NOTE

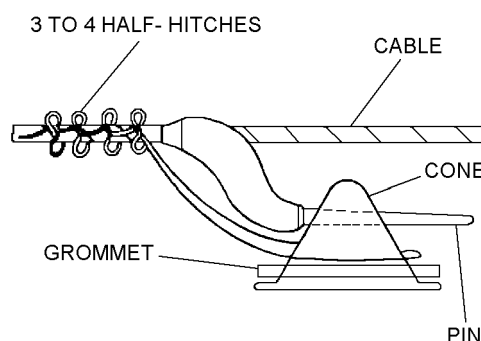
Painter line snaphook shall be attached temporarily to the end flap carrying handle opposite from ripcord end of container. This will provide for easy access to the painter line snaphook for attachment to aircraft.

22. Secure carrying case snap fasteners.

23. Tie free end of actuating line to ripcord cable loop with a bowline knot. Tack with three turns of waxed size E nylon thread, single. Tie off tacking with a surgeon's knot followed by a square knot. See figure 10-20.

24. Attach retaining line snaphook to end flap carrying handle on ripcord handle end of container. Snap container end closed. See figure 10-20.

25. Install ripcord and safety-tie first, middle, and last ripcord pin by passing a 12-inch length of size E nylon thread (V-T-295), single, under ripcord pin. Secure thread to ripcord cable with three or four half-hitches.



J0073025

Step 25 - Para 10-73

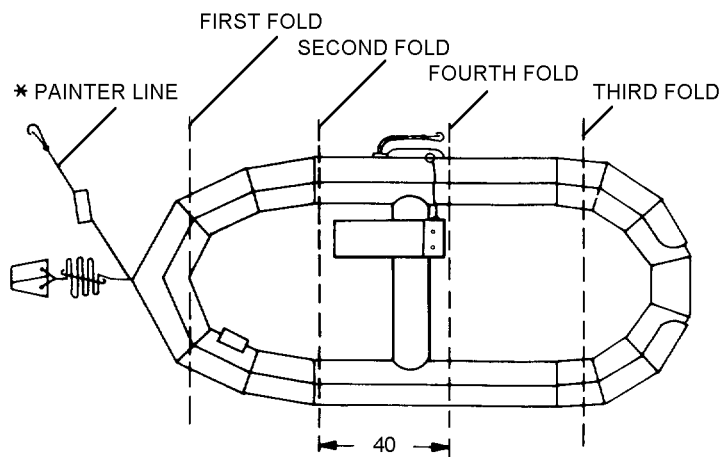
CAUTION

To prevent pull cable housing breakage, do not stow or store liferaft pack on ripcord handle end of pack.

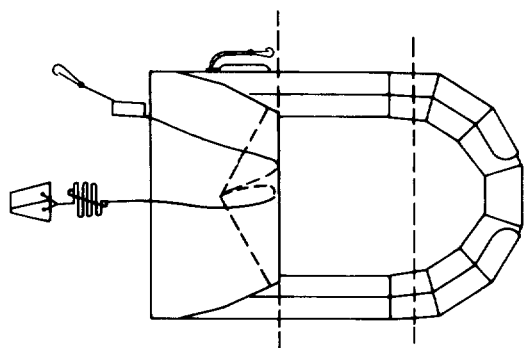
26. Snap ripcord protector flap closed, position ripcord handle under carrying case end flap and snap end flap closed. See step 6, figure 10-20.

27. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

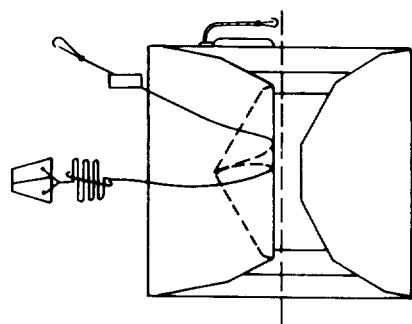
10-74. PACKING PROCEDURE FOR LRU-14 SERIES LIFERAFT ASSEMBLY (EXTERNAL LIFERAFT COMPARTMENT). To pack an LRU-14 series liferaft assembly for external liferaft compartment installation, proceed as follows:



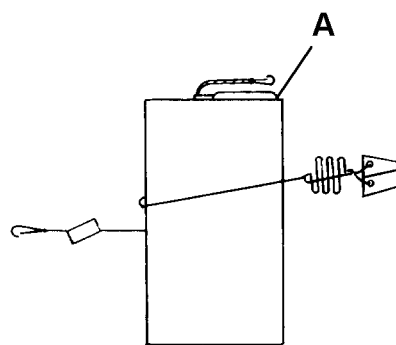
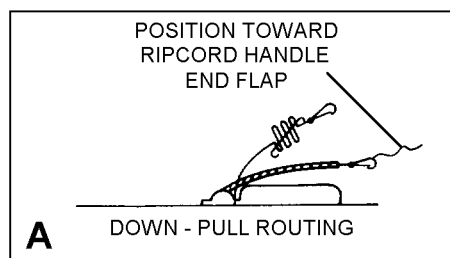
1. RAFT DEFLATED



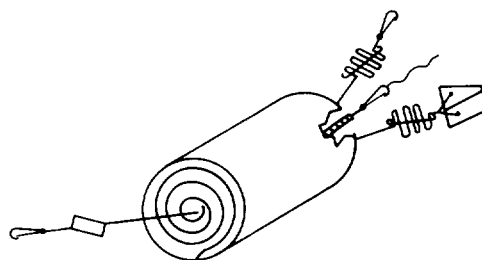
2. FIRST AND SECOND FOLD



3. THIRD FOLD



4. FOURTH FOLD

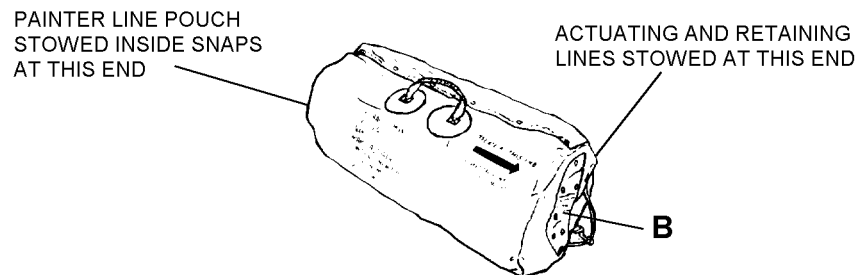


5. RAFT ROLLED
(DOWN - PULL)

* IF APPLICABLE

Figure 10-20. LRU-14 Series Folding Procedure - (Droppable) (Sheet 1 of 2)

1010A020



6. RAFT PACKED IN CARRYING CASE

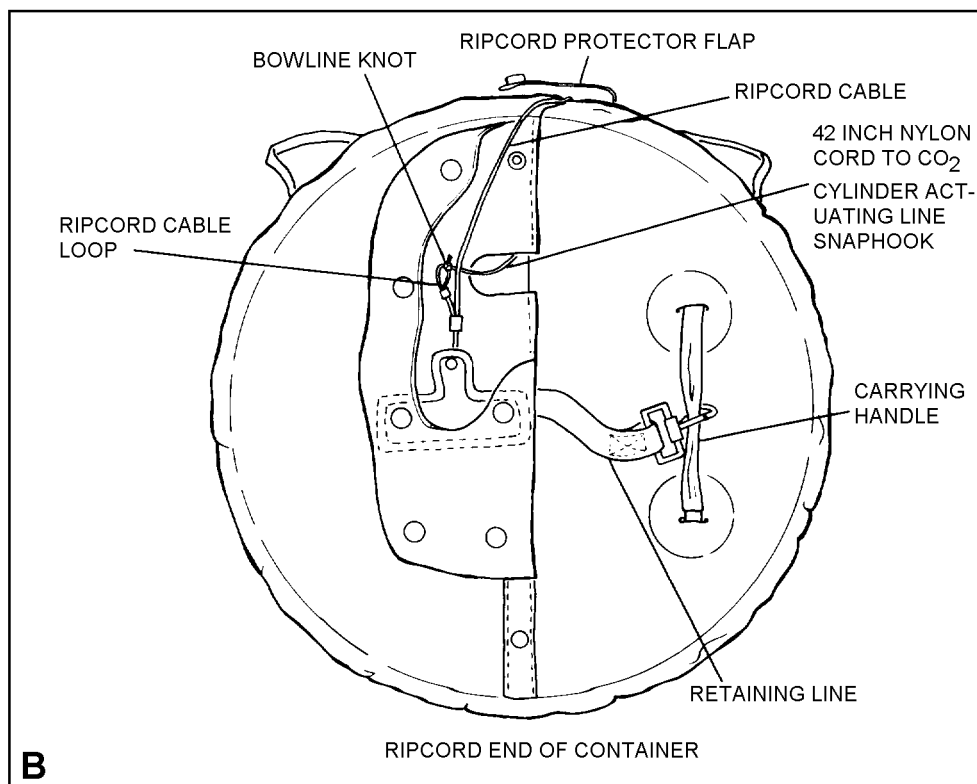


Figure 10-20. LRU-14 Series Folding Procedure - (Droppable) (Sheet 2 of 2)

1010B020

NAVAIR 13-1-6.1-1

1. Ensure that liferaft, carrying case (if applicable), and accessory container have been inspected in accordance with [paragraph 10-13](#).

2. Ensure that survival items and liferaft accessories have been inspected for expiration and damage. Refer to [table 10-7](#) for items used.

NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modification to the survival items.

Cushioning wrap (air bubble type) (NIIN 00-142-9008) is a suitable substitute for the rubber-coated cloth used to wrap breakable survival items.

3. Wrap breakable survival items with rubber-coated cloth and secure with rubber bands. Stow survival items in accessory container and supply pocket. Ensure that hand pump and PRT-5 transmitter are tied to accessory container grommet with a 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

4. Fake righting line and sea anchor mooring line, and secure with rubber bands.

5. If heaving lines are installed stow heaving lines in heaving line pockets as follows:

a. Secure the loose end of the heaving line to the loop in the bottom of the heaving line pocket with a bowline knot.

b. Remove all twists and tangles from heaving line and grommet.

c. Fake the heaving line in 11 to 13-inch bights on a flat surface, starting 12 to 15 inches from the loop in the bottom of the heaving line pocket.

d. Continue faking until 15 to 21 inches of line remains, measured from last bight of line to grommet.

e. Gather the heaving line and place a doubled 2-inch rubber band over the heaving line 1 to 2 inches from each end of the bights.

f. Place the heaving line under the grommet in the heaving line and close the pocket.

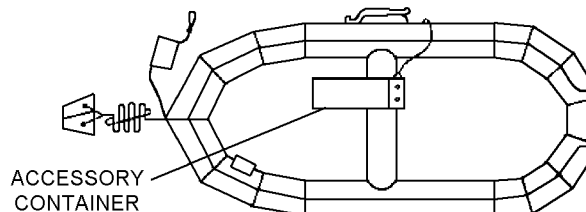
6. Ensure that all topping-off valves are closed and liferaft is completely deflated.

7. Secure latches on first aid kit with several layers of pressure-sensitive tape (NIIN 00-266-5016). Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container grommet and secure with a bowline knot. Stow first aid kit in accessory container.

NOTE

Ensure all items listed in [table 10-7](#) are stowed in accessory container including canopy ribs, bailing buckets and oars, if applicable.

8. Tie accessory container to nearest lifeline loop located next to CO₂ cylinder with a bowline knot. Use a 10-foot length of Type III nylon cord.



J0074008

Step 8 - Para 10-74

9. Secure supply pocket to mating snap fasteners on raft bulkhead. Ensure slider pull tab on supply pocket is tied to nearest lifeline loop with a 60-inch length of Type III nylon cord using bowline knots on both ends.

NOTE

All rafts stowed in external raft compartments shall be secured to the aircraft with a painter line. The painter line shall be a 60-foot length of Nylon cord, Type I (MIL-I-5040, NIIN 00-240-2154). The painter line retains a deployed raft to the aircraft during emergency egress and is designed to break under a 100-pound pull if the aircraft sinks.

10. Stow painter line in painter line pouch by forming eight 3 1/2-inch bights in line and inserting each bight in eight hesitator loops provided. Leave 24 inches of unstowed painter line at each end of pouch. See [figure 10-21](#). Close pouch; then secure with hook and pile tape provided.

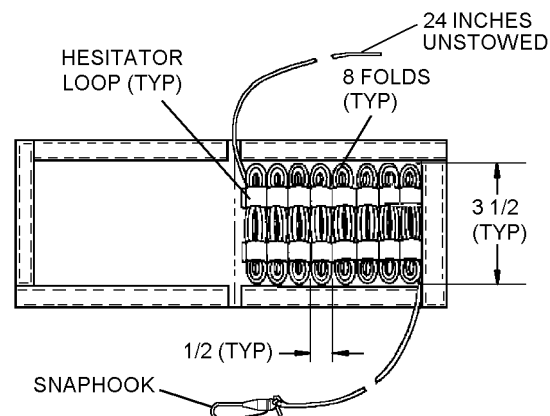
11. Attach snaphook to end of unstowed painter line extending from open end of pouch with a bowline knot.

12. Attach end of painter line without snaphook to the sea anchor mooring patch with a bowline knot.

13. Dust entire raft assembly lightly with talc powder (MIL-T-50036A).

WARNING

To prevent malfunction during inflation, ensure that no lifeline, sea anchor mooring line, righting line, painter line, or retaining line entangles or loops liferaft hardware during folding and packing procedures.



10100021

Figure 10-21. Stowed Painter Line

NOTE

Ensure canopy is rolled and secured to upper tube before folding liferaft.

14. Liferaft shall be folded in accordance with the applicable aircraft maintenance manual.

15. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

Section 10-4. Illustrated Parts Breakdown (IPB)

10-75. GENERAL.

10-76. This section lists and illustrates the assemblies and detail parts of the LRU-14 Inflatable Twelve-Man Liferaft.

10-77. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

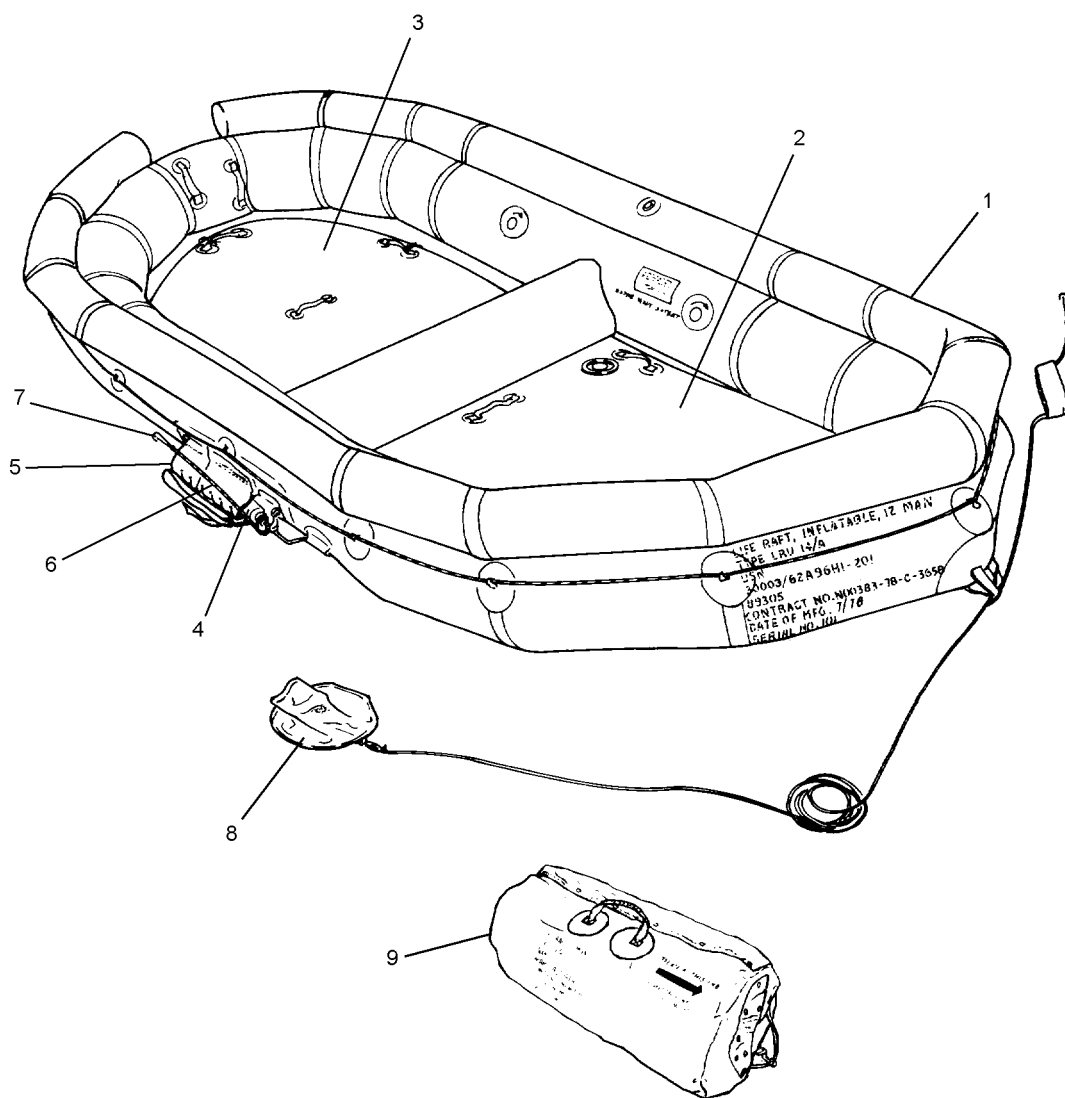


Figure 10-22. LRU-14 Series Liferaft Illustrated Parts Breakdown

10100022

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
10-22		LRU-14/A LIFERAFT ASSEMBLY (Note 6)	REF	
-1	62A96H1-201	. LIFERAFT, Twelve-Man Inflatable (Note 1) (LRU-14/A)	1	
	601AS101-1	. LIFERAFT, Twelve-Man Inflatable (Note 2) (LRU-14A/A)	1	
-2	62A96E3-1	. . INFLATABLE FLOOR ASSEMBLY, Bow	1	
-3	62A96E3-2	. . INFLATABLE FLOOR ASSEMBLY, Stern	1	
-4	63A120H1-71	. . INFLATION VALVE ASSEMBLY (Note 3) (Note 4)	1	
-5	MS26545B2C205A	. . . CO ₂ CYLINDER (Note 2) (Note 4)	1	
	MS26545B4C205A	. . . CO ₂ CYLINDER (Note 2) (Note 4)	1	
-6	1106AS102-1	. . . HOUSING ASSEMBLY	1	
-7	1106AS103-1	. . . CABLE ASSEMBLY	1	
-8	MIL-A-3339	. . SEA ANCHOR, Type 1, Size 2 (Note 5)	1	
-9	62A96H4-1	. CASE, Liferaft (NIIN 00-834-7854)	1	
<div>Notes:</div> <div><div>1.</div><div>Inflatable liferaft P/N 62A96H1-201 comes from supply with an inflation assembly P/N 63A120H1-71. The accessory container P/N 62A96D8-1001 and carrying case P/N 62A96H4-1 must be requisitioned separately.</div></div> <div><div>2.</div><div>Inflatable liferaft P/N 601AS101-1 comes from supply without inflation assembly P/N 63A120H1-71 and carrying case P/N 62A96H4-1. These items must be requisitioned separately.</div></div> <div><div>3.</div><div>Item is no longer procured or stocked. Item may be obtained through salvage.</div></div> <div><div>4.</div><div>The inflation valve and CO₂ cylinder may be requisitioned as a complete assembly P/N 63A120H1-15, NIIN 00-324-1701 (CAGE 30003).</div></div> <div><div>5.</div><div>Due to low demand, sea anchors may not be stocked. They may be open purchased from the Patten Co, 1803 Madrid Ave, Lake Worth, FL (561) 588-8500.</div></div> <div><div>6.</div><div>The LRU-14 series is being replaced by the new 12 person MPLR LRU-31/A, P/N 64500-101 on an attrition basis. See Chapter 12 for MPLR information. The LRU-14 is no longer available in supply.</div></div>				

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
-------------	----------------------------	--------------

MS26545B2C205A	10-22-5	
MS26545B4C205A	10-22-5	
1106AS102-1	10-22-6	PAOZZ
1106AS103-1	10-22-7	PAOZZ
601AS101-1	10-22-1	PAGGG
MIL-A-3339	10-22-8	PAOZZ

Part Number	Figure and Index Number	SM&R Code
-------------	----------------------------	--------------

62A96E3-1	10-22-2	PAOGG
62A96E3-2	10-22-3	PAOGG
62A96H1-201	10-22-1	PAGGG
62A96H4-1	10-22-9	
63A120H1-71	10-22-4	XBOZZ

CHAPTER 11

LRU-15/A (MK-20) LIFERAFT ASSEMBLY

Section 11-1. Description

11-1. GENERAL.

NOTE

New procurements of twenty-man liferafts will be designated LRU-15/A. Reference to the designation MK-20 has been deleted throughout this chapter. However, all procedures and requirements referenced in this chapter pertaining to the LRU-15/A also apply to MK-20 liferafts.

11-2. The LRU-15/A is a twenty-man inflatable liferaft intended for use by aircrewmembers forced down at sea. It is stowed either in a readily accessible area inside the aircraft fuselage or in an aircraft compartment designed for liferafts.

11-3. CONFIGURATION.

11-4. The LRU-15/A Liferaft Assembly (see figure 11-1 through 11-3) consists of a twenty-man liferaft constructed of polychloroprene-coated cloth and an inflation assembly (CO₂ cylinder, inflation valve and cover). The liferaft consists of two single-compartment circular tubes connected by an equalizer tube, a noninflatable floor suspended between the circular tubes and a boarding ramp permanently attached to each tube. The floor is provided with a built-in inflatable floor support. A sea anchor is stowed in a pocket at the junction of the circular tubes. An inner lifeline, boarding handles, a heaving line, and emergency survival equipment stowed in the accessory container are provided. Topping-off valves are located on each side of the circular tubes, and on each side of the floor support.

NOTE

To make up the packaged assembly complete with accessories and survival items, all required components not supplied with the

raft assembly must be individually requisitioned.

The following subassemblies have been deleted from newly procured LRU-15/A liferafts: mast socket components, canopy related components, and one accessory container. New liferafts shall not be reworked to add subassemblies and older liferafts shall not be reworked to remove subassemblies since their presence is not detrimental to function of liferaft.

11-5. APPLICATION.

11-6. Multi-place liferafts are authorized for all rotary and fixed wing transport aircraft. Selection shall be based on mission, available storage space, and total number of crew and passengers carried. Additional consideration shall be made for the liferaft inspection cycle. C-130 series (except the C-130J) wing storage is limited to the LRU-15/A in the wing installation configuration. The C-130J wing storage is limited to the LRU-33/A and the Air Cruisers 46-man P/N 63880-103/104. The V-22 is limited to the LRU-34/A and liferafts listed in the current V-22 flight clearance.

11-7. FUNCTION.

11-8. The LRU-15/A Liferaft Assembly (droppable) is inflated by pulling the inflation assembly actuating handle, located outside the carrying case end flap. The LRU-15/A Liferaft Assembly (wing installation) is automatically ejected from the liferaft compartment after the liferaft compartment door has been released, and inflated. A unique design feature of the LRU-15/A is that it is always right-side-up after inflation. The inflation assembly inflates the circular tubes and boarding ramps only. In the event the inflation assembly does not function properly, the equalizer tube distributes gas equally between each circular tube. After boarding, the floor support is inflated with the hand pump provided in the accessory container. The circular tubes may be topped-off, if necessary, from either side of the liferaft floor.

Table 11-1. Deleted

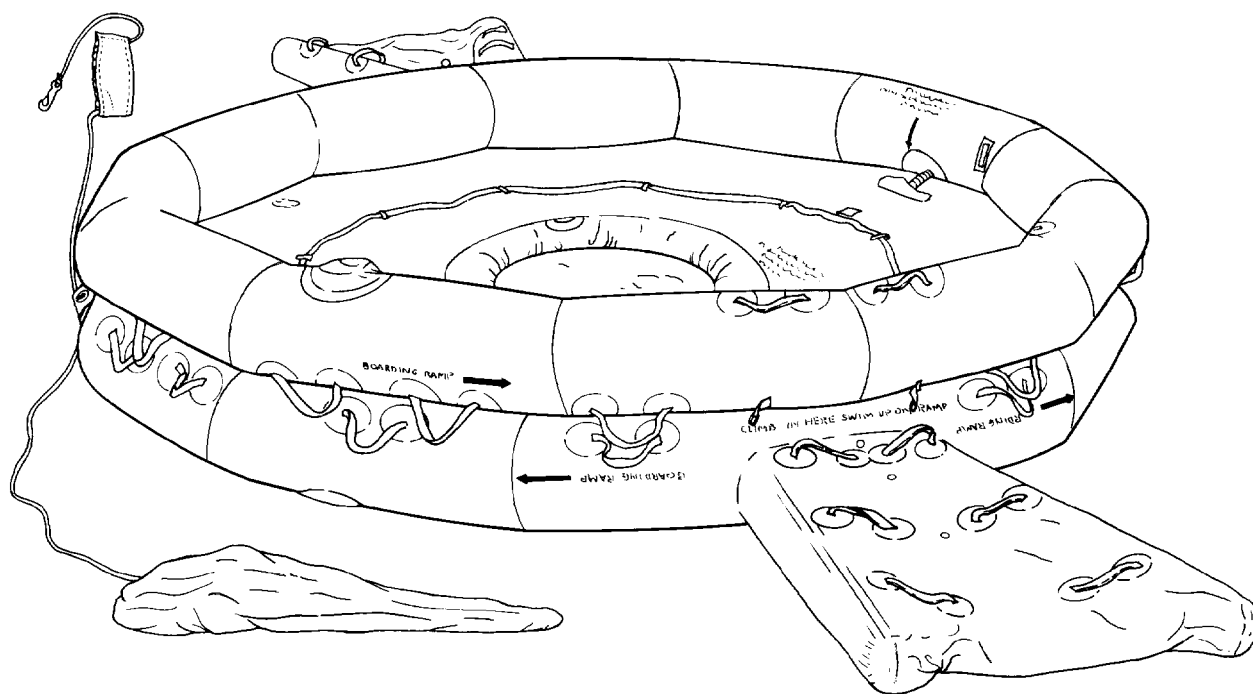


Figure 11-1. LRU-15/A Liferaft Assembly

10110001

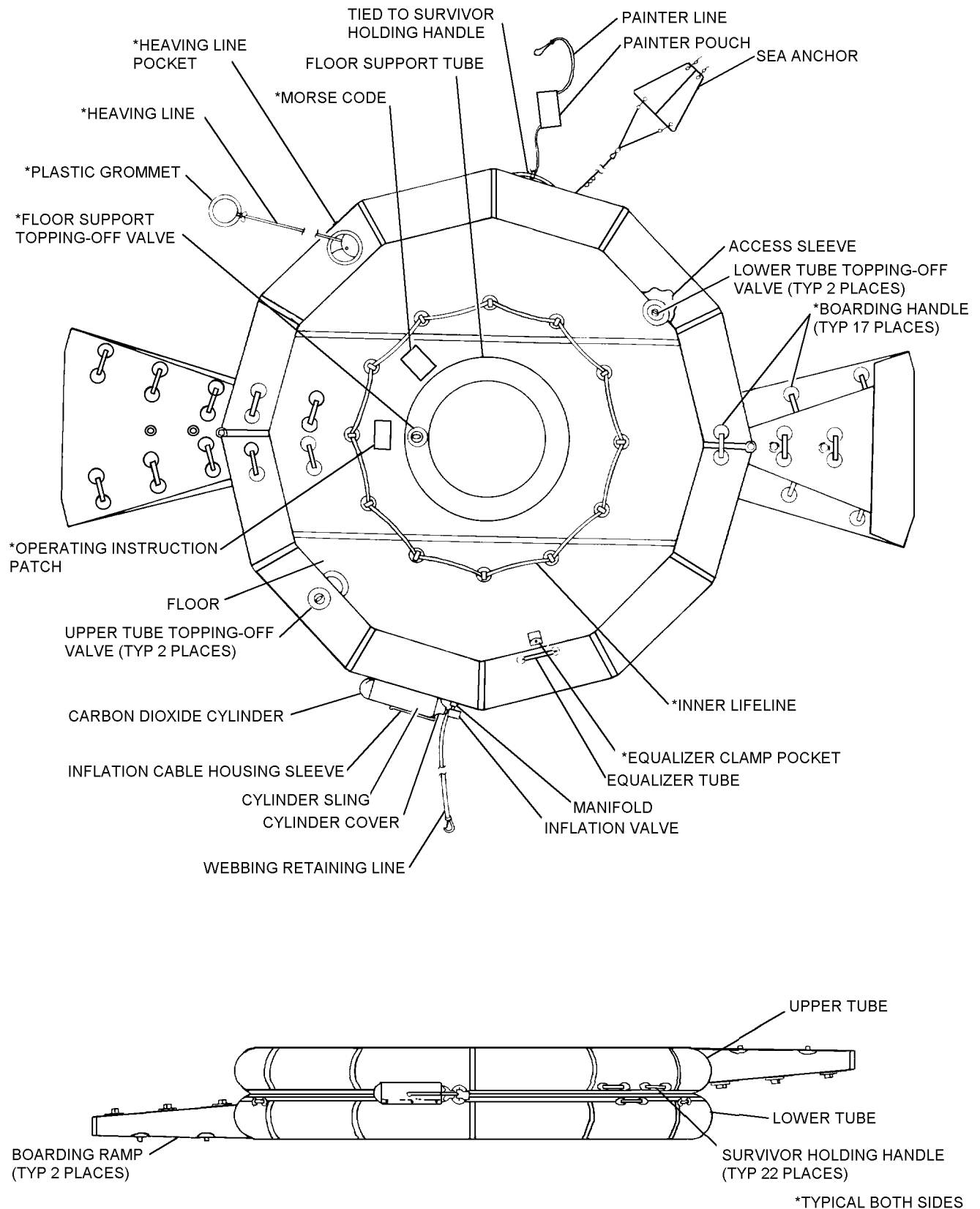


Figure 11-2. LRU-15/A Liferaft Assembly, Parts Nomenclature

10110002



Figure 11-3. LRU-15/A Carrying Cases and Accessory Container

Section 11-2. Modifications

11-9. GENERAL.

pairs and fabrications to maintain serviceability are listed in table 11-2.

11-10. There are no authorized modifications to the LRU-15/A liferaft assembly at this time. Common re-

Table 11-2. LRU-15/A Common Repairs and Fabrications

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	11-51
Cementing Liferafts	11-52
Patching Liferafts	11-53
Recementing or Replacing Seam Tapes	11-54
Sea Anchor/Mooring Line Replacement	11-55
Replacement of Locking Cones	11-57
Relocation of Retaining Line Instruction Tag	11-58
Soldering of Snaphook Spring Latch on Remote Actuator Assembly	11-59
Fabrication of Painter Line Pouch	11-60
Drilling Holes in P/N A128-RT-1	11-61
Drilling Holes in P/N IV0303 Inflation Valve	11-62
Drilling Holes in P/N A128 Inflation Valve	11-63
Drilling Holes in P/N 871444 Inflation Valve	11-64
Fabrication of Cylinder Valve Antichafing Sleeve	11-65
Replacement of Topping-off Valve	11-66
Fabrication of Liferaft Container for C-130 Aircraft	11-67 (Note 1)
Fabrication of Mockup C-130 Wingwell	11-68 (Note 1)
Removal of Inlet Check Valve Elements and Fabrication of Identification Patch	11-69 (Note 2)
Replacement of Manifold	11-70 (Note 2)
Fabrication of Survivor Attachment Strap	11-71 (Note 3)
Replacement of Liferaft Heaving Line	11-72
Repair of Carrying Case	11-72A
Notes: 1. All C-130 wing installed 2. All wing installed 3. All LRU-15/A Droppable	

Section 11-3. Maintenance

11-11. GENERAL.

11-12. This section contained information on inspection, disassembly, repair/replacement, testing, and reassembly of the LRU-15/A liferaft.

11-13. INSPECTION.

11-14. All liferaft assemblies shall be subjected to Preflight/Special and Calendar/Phase Inspections.

11-15. The Preflight Inspection shall be performed on fuselage-installed liferafts prior to first flight of the day. This inspection shall be performed by line personnel (plane captain or delegated aircrewmember) who have been designated by the line division officer, instructed and found qualified by the Aviator's Equipment Branch.

11-16. The Special Inspection shall be performed on fuselage-installed liferafts every 30 days. This inspection shall be performed at the organizational level of maintenance by personnel assigned to the Aviator's Equipment Branch. Upon completion, the date of inspection and inspector's signature shall be entered on appropriate form in accordance with OPNAVINST 4790.2 Series.

11-17. All liferafts shall be subjected to the Calendar/Phase Inspection prior to placing in service or, if an aircraft inventory item, at the time of the aircraft Acceptance Inspection. Thereafter, the Calendar/Phase Inspection interval shall coincide with the aircraft inspection cycle in which they are installed, except the helicopter back pack, which shall be inspected every 225 days. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 231 days. Unless operational requirements demand otherwise, the liferaft Calendar/Phase Inspection shall be performed by intermediate level of maintenance or above.

NOTE

A functional test and pull cable proof load test shall be performed prior to placing in service or during aircraft Acceptance Inspection, and each fourth inspection cycle thereafter. A leakage test shall be performed at each inspection cycle. If inspection indicates damage beyond capability of maintenance, complete applicable forms in accordance with OP-

NAVINST 4790.2 Series and forward entire assembly to supply. Refer to [paragraph 11-51](#) for determination of repairability.

11-18. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentman shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance within their work centers. OPNAVINST 4790.2 Series permits them to nominate their more experienced personnel to be Collateral Duty Inspectors. Those nominated are screened and examined by the units Quality Assurance Officer prior to being designated Collateral Duty Inspectors by the Commanding Officer. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

11-19. PREFLIGHT/SPECIAL INSPECTION (FUSELAGE-INSTALLED LIFERAFTS). To perform a Preflight/Special Inspection, visually inspect for the following:



Do not open liferaft access doors or any sealed or safety-wired/safety tied portion of liferaft for this inspection.

NOTE

For wing installed liferafts, perform Preflight/Special Inspections in accordance with applicable aircraft MIMS.

1. Fabric for cuts, tears, deterioration and abrasion.
2. Seams for proper adhesion or stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage and security.
5. All hardware for security of attachment, corrosion, damage, wear, and if applicable, ease of operation.
6. Liferaft retaining line for proper stowage.

7. Liferaft painter line for presence and attachment.

8. Heaving line for proper stowage (if applicable).

9. Ensure that liferaft is properly stowed. Check for bulges caused by trapped air in liferaft.

10. Ripcord pins and cable for bends, fraying, or other damage; ripcord pins for security of attachment to cable.

11. Swaged ball on handle and swaging sleeve on cable for security.

WARNING

Use only authorized safety tie. No tape, wire, or cord shall be employed to secure ripcord pins.

12. Ripcord pins fully inserted into cones, first, middle and last, and ripcord pins safety-tied to cones with one turn size E nylon thread (V-T-295), single.

13. Snap fasteners on end flaps and ripcord protector flap securely fastened.

14. If discrepancies are found or suspected, Maintenance Control shall be notified.

11-20. ACCEPTANCE/CALENDAR/PHASE INSPECTION. The Acceptance/Calendar/Phase Inspection consists of the following major tasks (to be performed in the order listed):

1. Container/Case Inspection
2. Functional Test (If Required)
3. Pull Cable Proof Load Test (If Required)
4. Deflation
5. Functional Test and Adjustment of Manifold
6. Visual
7. Liferaft Configuration
8. General Inspection
9. Markings Inspection
10. Survival Items and Accessories Inspection
11. Inflation Assembly Inspection
12. Inspection of Inflation Assembly (Charged)
13. Inspection of Inflation Assembly (Discharged)

14. Cylinder Markings

15. Leakage

16. Records Updating

17. Repacking

11-21. PACKED CONTAINER/CASE INSPECTION. To inspect packed containers/cases, examine the following:

1. Fabric for cuts, tears, deterioration, and abrasion.
2. Seams for proper adhesion of stitching.
3. Straps and handles for security and wear.
4. Any other parts for wear, damage, and security.
5. All hardware for security of attachment, corrosion, damage, wear and, if applicable, ease of operation.
6. Container and/or case for stains, dirt, and general condition.

11-22. FUNCTIONAL TEST. To functionally test a liferaft, proceed as follows:

CAUTION

Ensure that there is adequate area free of foreign objects for liferaft inflation.

1. Open liferaft case and unfold liferaft. The functional test shall be performed with the carbon dioxide bottle that was attached during the raft's last inspection. If actuation of the attached bottle will cause it to be non-RFI due to hydrostatic test requirements, and no replacement bottles are available, contact fleet support team for instructions.

2. Actuate inflation assembly.

3. On aircraft wing-installed liferafts, ensure the vent/shut poppet went to the up (SHUT) position after actuation, indicating that manifold vent is shut. If manifold P/N 9153 does not shut, perform functional test and adjustment, [paragraph 11-24](#). If manifold P/N C-50980 does not shut, dispose of and replace with new manifold (there are no adjustments to this manifold).

4. Measure time of inflation; liferaft shall inflate to design shape without evidence of restriction in less than 1 minute.

5. Examine liferaft for obvious damage such as cuts, tears, ruptured seams, and damaged manifold.

6. Determine cause if liferaft does not properly inflate. Remove manifold and valve, and inspect for cleanliness and embedded foreign matter.

7. Inspect manifold P/N 9153 nylon gaskets at raft connection point for damage and proper positioning. Inspect manifold P/N C-50980 copper seals at raft connection point for damage and proper positioning. For both manifolds ensure nylon gasket P/N 1106AS108-3 is not wedged in port between manifold and CO₂ cylinder valve.

WARNING

When reinstalling manifold (P/N 9153), ensure that nylon gaskets (P/N 1106AS108-2) are properly positioned; the two nylon gaskets with larger inside diameters are to be placed toward liferaft. When reinstalling manifold (P/N C-50980), ensure copper seals (P/N A50969) are present and properly positioned around the set screws on the outlets. Do not use nylon gaskets on the outlets with manifold P/N C-50980.

8. Install manifold, nylon gaskets and copper seals if required. Torque to 140 to 150 in-lb.

9. If correction is made, repeat [steps 2 through 5](#).

10. Depress vent/shut poppet; liferaft shall begin venting. On aircraft wing-installed liferafts, depress poppet on manifold; liferaft should begin venting.

11. (LRU-15/A with Manifold) Pull out vent/shut poppet; venting should stop. For manifold P/N 9153 use a test adapter as manufactured in [paragraph 11-24, step 1](#). For manifold P/N 50980 use a 6-40 threaded screw.

12. Deflate liferaft in accordance with [paragraph 11-25](#). Ensure that all carbon dioxide has been removed.

11-23. PULL CABLE PROOF LOAD TEST. To perform the proof load test, proceed as follows:

NOTE

Perform the Proof Load Test only after the functional test and prior to placing an inflation assembly in service.

1. Remove inflation valve cover plate.

2. Remove pull cable from valve and apply a 50-pound pull force between cable ball and snaphook.

3. Examine pull cable for broken strands of wire, deformed snaphook, security of snaphook spring latch attachment, and loose or cracked swage fittings. If any damage is found, the pull cable shall be discarded and replaced with a new cable. The new cable shall also be tested in accordance with [step 2](#). If snaphook spring latch is loose, it may be repaired in accordance with instructions contained in modification section for the liferaft, or replaced at the discretion of the inspection activity.

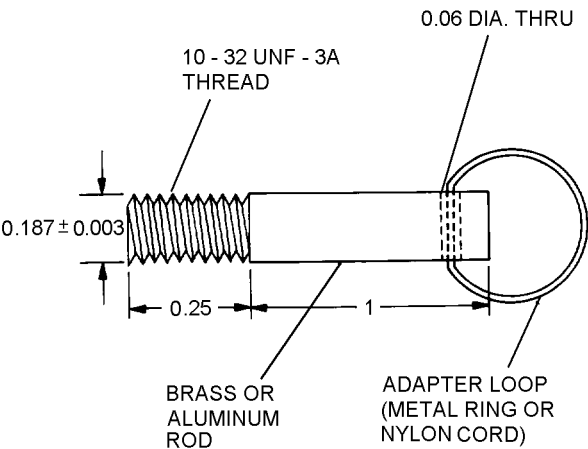
4. If pull cable passes this test, reinstall in accordance with [paragraph 11-47](#).

11-24. FUNCTIONAL-TEST AND ADJUSTMENT OF P/N 9153 MANIFOLD. To perform the functional test and/or adjust the force required to pull out the vent/shut poppet, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pull Test Adapter	9141 (CAGE 97375) Fabricate in accordance with step 1
1	Dial Push/Pull Gage, 0-50 lb	DPPH50 (CAGE 11710) or equivalent NIIN 00-473-0108

1. Fabricate a pull test adapter as shown if adapter is not available.



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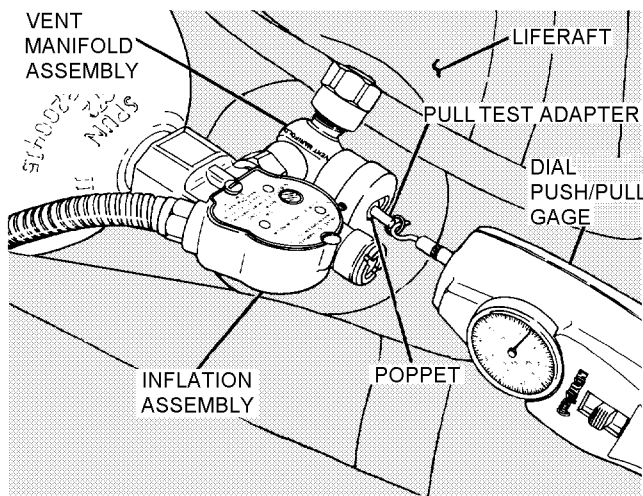
Step 1 - Para 11-24

2. Thread pull test adapter into vent/shut poppet.

NOTE

Ensure that vent/shut poppet is in the down (VENT) position.

3. Attach dial push/pull gage to pull test adapter. Measure force required to pull out vent/shut poppet. Force required shall be 6 to 7 pounds.

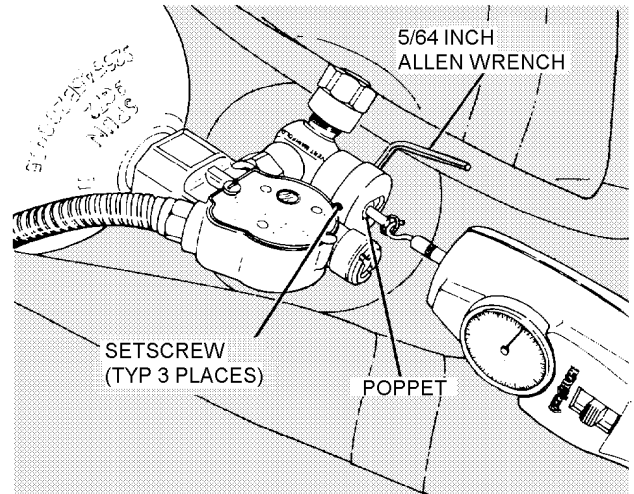


Step 3 - Para 11-24

NOTE

If force to pull out vent/shut poppet was acceptable (6 to 7 pounds), proceed to [step 6](#). If the force was greater than 7 pounds or less than 6 pounds, make adjustment in accordance with [step 4](#).

4. Using a 5/64-inch Allen wrench, symmetrically adjust three setscrews on manifold. If force was greater than 7 pounds, back out setscrews; if force was less than 6 pounds, tighten setscrews until 6- to 7-pound requirement is met.



Step 4 - Para 11-24

5. If 6- to 7-pound requirement cannot be met, replace manifold in accordance with [paragraph 11-70](#).
6. Depress vent/shut poppet to set manifold to vent position.

11-25. DEFLATION. To deflate liferaft, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Vacuum Unit	61E44688 (CAGE 80049)
As Required	Hose, Rubber, 3/8 or 1/2 inch Inside Diameter	—

1. Attach one end of rubber hose to vacuum pump.
2. Open valve and hold vacuum pump hose over opening in valve. When compartment is collapsed, screw valve closed.

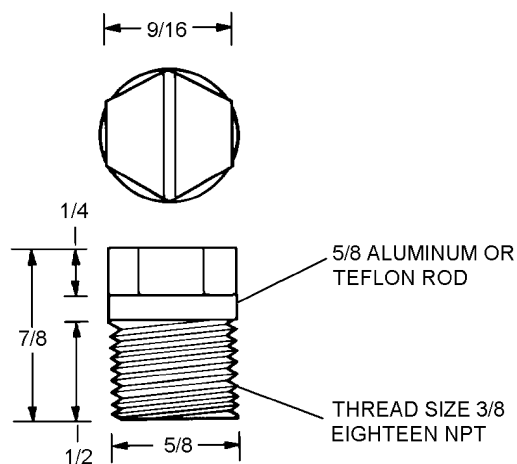
3. Pull the overlapping tube material away from the CO₂ cylinder as the upper and lower tubes deflate. Ensure CO₂ cylinder does not rest on tube material of deflated raft.

11-26. VISUAL INSPECTION. Prior to visually inspecting a liferaft assembly, the liferaft (and inflatable floors, if applicable) shall be inflated with air to 1.0 psig.



Remove CO₂ cylinder prior to inflating liferaft with air.

1. Remove CO₂ cylinder from CO₂ cylinder sling.
2. Fabricate a LRU-15/A Manifold Inlet cap (test plug) as follows.



Step 2 - Para 11-26

K0026002

3. Cap manifold inlet or install an empty CO₂ cylinder.

NOTE

If a suitable air source is not available, water pumped nitrogen (BB-N-411) may be substituted.

4. Inflate liferaft with air to 1.0 psig.

11-27. LIFERAFT CONFIGURATION. The liferaft shall be updated by comparing it to the applicable configuration illustrations in [Figures 11-1 through 11-3](#), and in [Section 11-4](#).

11-28. GENERAL INSPECTION. To perform the general inspection, inspect the following:

NOTE

If color, location, or stitching patterns of repaired, replaced, or previously incorporated noncritical items or features (eg, liferaft pockets, handle, ballast bag, sea anchor, etc.) do not exactly conform to instructions, do not remove or rework item or feature if flotation stability or capability and security of attachment are not compromised.

1. Liferaft fabric for cuts, tears, punctures, deterioration and abrasion.
2. Seam tapes for proper adhesion.
3. Seam tapes joining tubes to floors, other tubes or canopy for adhesion and wear.
4. Liferaft floor and canopy for cuts, tears, punctures, and abrasions.
5. All patches for proper adhesion.
6. Pockets for tears, abrasions, and security of attachment.
7. Handles for wear, deterioration, and security of attachment.
8. Sea anchor for wear, tears, and security of attachment.
9. Damaged or deteriorated topping-off valve, if applicable, and security of retaining screw.
10. All hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.
11. Liferaft for stains, dirt, and general cleanliness.
12. Any other parts for wear and damage.

13. Perform functional test in accordance with paragraph 11-22.

11-29. MARKINGS INSPECTION. Compare markings on liferaft and case and/or container to markings shown in [Table 11-3](#) through [Table 11-6](#) as applicable. Restore faded markings. Install/replace inspection record patch as needed; refer to [paragraph 11-56](#). Correct any markings which do not agree with the applicable table. To change markings, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Marking, Laundry, Black	SPE-92 NIIN 00-161-4229
	-or-	
	Ink, Drawing, Waterproof, Yellow	A-A-59291 NIIN 00-634-6583

1. Paint over incorrect marking using waterproof ink (yellow or black as applicable).

2. Add correct marking as close as possible to specified location using waterproof ink.

11-30. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

With the exception of batteries, items reaching over-age while packed in survival kits and rafts shall remain in service until the next inspection cycle of the completed assembly.

1. Inventory all accessories and survival items by checking items against [Table 11-7](#). Replace missing or unsatisfactory items.

NOTE

Ensure URT-33 battery service life does not expire prior to the next scheduled calendar inspection. Refer to NAVAIR 16-30URT33-1 for battery service life. Batteries which exceed service life requirements must be discarded regardless of their condition.

2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

NOTE

NAVAIR 13-1-6.5 contains information in inspection/replacement and modification of the survival items.

3. Operate all items which are not expended in use. Replace as necessary.

11-31. INFLATION ASSEMBLY INSPECTION. Inspect the inflation assembly as follows:

11-32. Inspection of Inflation Assembly (Charged). To inspect a charged inflation assembly, proceed as follows:

WARNING

Gas under pressure. Do not attempt to remove valve from cylinder.

1. Inspect cylinder markings. Re-mark as required in accordance with [paragraph 11-34](#).

2. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damage or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced perform pull cable proof load test in accordance with [paragraph 11-23](#).

NOTE

To obtain the correct gross weight of the CO₂ cylinder, subtract weight of the diffuser plug from total weight indicated on scale.

3. Weight inflation assembly. If weight indicated on scale is not the same as the gross weight printed on the cylinder (P/N MS26545B2C0415, NIIN 00-595-3698) with tolerance specified, or if no gross weight is printed on the cylinder, discharge the cylinder and recharge it to 9.14 to 9.26 lbs in accordance with [paragraph 11-46](#).

WARNING

Inspect safety wire to ensure that wire size and type are as specified in [paragraph 11-47](#).

4. If necessary, safety-wire the assembly in accordance with [paragraph 11-47](#).

Table 11-3. LRU-15/A Liferaft Markings


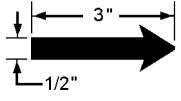

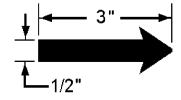

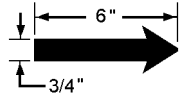
Marking	Location	Letter Height
LIFERAFT, INFLATABLE TWENTY-MAN TYPE LRU-15/A USN 30003/63A80H1- [applicable dash number] MANUFACTURER'S IDENTIFICATION CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Tube, segment adjacent to cylinder sling, outboard	1 inch
EQUALIZER TUBE-CLAMP SHUT AFTER FLOTATION TUBES ARE INFLATED 	Tube segment adjacent to equalizer tube, inboard*	3/4 inch 
 USE SEA ANCHOR TO REDUCE DRIFT	On tube adjacent sea anchor pocket, inboard*	3/4 inch 
BOARDING RAMP 	1/2-inch below center line of every second tube segment*	3/4 inch 
CLIMB IN HERE, SWIM UP ON RAMP	On tube above each boarding ramp	3/4 inch
TUBE NUMBERS	Starting at carbon dioxide cylinder and working clockwise, number the outboard side of each upper tube segment consecutively from 1 through 12.	1/2 inch
	Starting at carbon dioxide cylinder and working clockwise, number the outboard side of each tube segment consecutively from 13 through 24	1/2 inch
INFLATION VALVE UPPER TUBE	On tube adjacent to topping-off valve*	3/4 inch
INFLATION VALVE LOWER TUBE	On both sides of floor adjacent to topping-off valve*	3/4 inch
HEAVING LINE	On tube adjacent to heaving line pocket*	1/2 inch

Table 11-3. LRU-15/A Liferaft Markings (Cont)

Marking	Location	Letter Height
KEEP ACCESSORIES TIED TO RAFT TO AVOID LOSS IN CASE OF CAPSIZING	On both sides of floor adjacent to floor support tube	3/4 inch
INFLATION VALVE FLOOR SUPPORT	On both sides of floor adjacent to toping-off valve in floor support tube	3/4 inch
CLAMP EQUALIZER TUBE	On both sides of floor adjacent to equalizer clamp pocket	1/2 inch
SHARP ITEMS ON CLOTHING MAY PUNCTURE RAFT	On both sides of floor adjacent to floor support tube	3/4 inch
CYLINDER COVER	Cylinder cover	1/2 inch
INFLATION VALVE OPERATION TO INCREASE TUBE PRESSURE 1. SCREW HAND PUMP INTO VALVE CAP 2. ROTATE VALVE CAP 1 1/2 TURNS TO THE RIGHT 3. PUMP TO INFLATE TO DESIRED PRESSURE 4. ROTATE VALVE CAP 1 1/2 TURNS TO LEFT AND RE- MOVE PUMP TO DECREASE TUBE PRESSURE 1. ROTATE VALVE 1 1/2 TURNS TO RIGHT AND BLEED	On patch located on both sides of floor adjacent to floor support tube	3/8 inch 1/4 inch 3/16 inch 1/4 inch 3/16 inch
SEA ANCHOR MIL-A-3339B Type I Size 3 MANUFACTURER CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year]	Inside of sea anchor	1/4 inch
INTERNATIONAL MORSE CODE [see figure 11-2]	Stenciled on both sides of floor adjacent to floor support tube	1/4 inch
BEFORE INFLATION CLIP SNAPHOOK TO LIFE VEST	On a tag attached to webbing retaining line. (Only on the droppable type packaged LRU-15/A configuration.)	3/8 inch

Table 11-3. LRU-15/A Liferaft Markings (Cont)

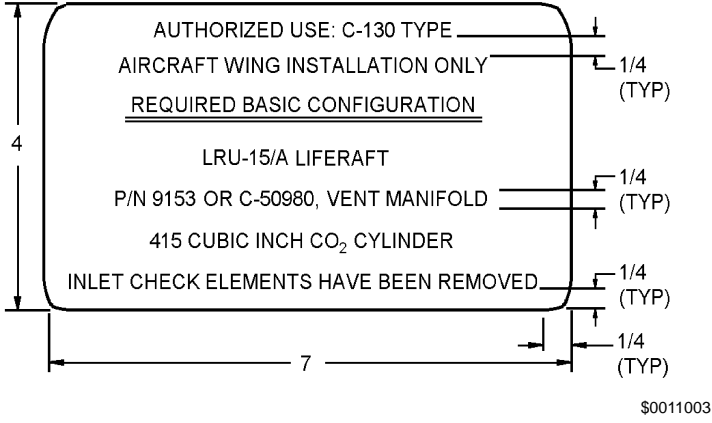
Marking	Location	Letter Height
 <p> AUTHORIZED USE: C-130 TYPE AIRCRAFT WING INSTALLATION ONLY <u>REQUIRED BASIC CONFIGURATION</u> LRU-15/A LIFERAFT P/N 9153 OR C-50980, VENT MANIFOLD 415 CUBIC INCH CO₂ CYLINDER INLET CHECK ELEMENTS HAVE BEEN REMOVED \$0011003 </p>	Upper tube, directly above manifold	As shown
<p>Note: Replacement markings shall be stamped or stenciled using waterproof black ink. *Marking located on both upper and lower tubes.</p>		

Table 11-4. LRU-15/A Case and Container Markings


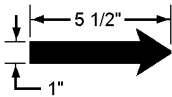
Case/Container	Marking	Location	Letter Height
Carrying Case (wing installation type)	LIFERAFT, TWENTY-MAN LRU-15/A MIL-L-009131G(AS) MANUFACTURERS IDENTIFICATION CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable number] DO NOT USE THIS CASE ON DROPPABLE TYPE RAFT PACKS	Between handle keepers on one side of carrying case Both sides of carrying case	1 inch 1 inch
	LIFERAFT, TWENTY-MAN LRU-15/A, DROPPABLE USN 30003/63A80H6-1 MANUFACTURERS IDENTIFICATION CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable number]	Between handle keepers on one side of carrying case	1 inch
Carrying Case (droppable type)	INFLATE AT THIS END 	Both sides of carrying case at pull handle end	1 inch 
	IF VERTICAL STOWAGE THIS END UP	Both sides of case below arrow	1 inch
	INFLATE OTHER END	End panel opposite pull handle end	1 inch
	TO INFLATE, LIFT FLAP, PULL HANDLE OUT UNTIL FREE	Pull handle flap	1/2 inch
Accessory Container (wing installation)	20 MAN LIFERAFT ACCESSORY CONTAINER ASSY FOR WING INSTALLATION IN KC130F AND C130F AIRCRAFT	Main panel	1 inch
Accessory Container (droppable)	TWENTY-MAN RAFT ACCESSORY CONTAINER DROPPABLE MIL-L-009131	Side panel	1/2 inch
Accessory Container (droppable and wing installation)	Each accessory container will be marked with the name of the equipment stored in the container. Refer to table 11-7 .	Main panel	1/2 inch
Note: Replacement markings shall be stamped or stenciled using waterproof black ink.			

Table 11-5. MK-20 Liferaft Markings


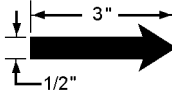

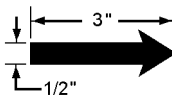

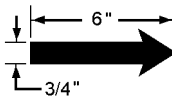
Marking	Location	Letter Height
LIFERAFT, INFLATABLE TWENTY-MAN TYPE MARK 20 USN 30003/63A80H1- [applicable dash number] MANUFACTURER'S IDENTIFICATION CONTRACT NO. [applicable number] DATE OF MANUFACTURE [month and year] SERIAL NO. [applicable number]	Tube, segment adjacent to cylinder sling, outboard	1 inch
EQUALIZER TUBE-CLAMP SHUT AFTER FLOTATION TUBES ARE INFLATED 	Tube segment adjacent* to equalizer tube, inboard	3/4 inch 
 USE SEA ANCHOR TO REDUCE DRIFT	On tube adjacent * sea anchor pocket, inboard	3/4 inch 
BOARDING RAMP 	1/2-inch below center* line of every second tube segment	3/4 inch 
CLIMB IN HERE, SWIM UP ON RAMP	On tube above each boarding ramp	3/4 inch
TUBE NUMBERS	Starting at carbon dioxide cylinder and working clockwise, number the outboard side of each upper tube segment consecutively from 1 through 12.	1/2 inch
	Starting at carbon dioxide cylinder and working clockwise, number the outboard side of each tube segment consecutively from 13 through 24	1/2 inch
INFLATION VALVE UPPER TUBE	On tube adjacent to * topping-off valve	3/4 inch
INFLATION VALVE LOWER TUBE	On both sides of floor* adjacent to topping-off valve	3/4 inch
HEAVING LINE	On tube adjacent to* heaving line pocket	1/2 inch

Table 11-5. MK-20 Liferaft Markings (Cont)


Marking	Location	Letter Height
KEEP ACCESSORIES TIED TO RAFT TO AVOID LOSS IN CASE OF CAPSIZING	On both sides of floor adjacent to floor support tube	3/4 inch
INFLATION VALVE FLOOR SUPPORT	On both sides of floor adjacent to topping-off valve in floor support tube	3/4 inch
CLAMP EQUALIZER TUBE	On both sides of floor adjacent to equalizer clamp pocket	1/2 inch
SHARP ITEMS ON CLOTHING MAY PUNCTURE RAFT	On both sides of floor adjacent to floor support tube	3/4 inch
CYLINDER COVER	Cylinder cover	1/2 inch
<p><u>TO INFLATE TUBES MANUALLY</u></p> <p>ATTACH HAND PUMP TO VALVE CAP, UNSCREW CAP 1 1/2 TURNS TO THE RIGHT, AND THEN PUMP TO INFLATE RAFT. WHEN DESIRED PRESSURE IS ATTAINED, TIGHTEN VALVE CAP AND REMOVE PUMP.</p> <p><u>TO DECREASE PRESSURE</u></p> <p>OPEN VALVE 1 1/2 TURNS TO THE RIGHT AND BLEED</p>	On a white rubber patch located on both sides of floor adjacent to floor support tube	1/4 inch
<p>TO OPEN</p> 	<p>Outer cover patch of* topping-off valve located in tube</p> <p>On both sides of floor adjacent to topping- off valve (without cover patch) located in tube</p>	<p>1/2 inch</p> <p>1/2 inch</p>
INTERNATIONAL MORSE CODE [see figure 11-2]	Stenciled on both sides of floor adjacent to floor support tube	1/4 inch
BEFORE INFLATION CLIP SNAPHOOK TO LIFE VEST	On a tag attached to webbing retaining line. (Only found on liferafts used on the droppable type packaged LRU-15/A configuration.)	3/8 inch

Table 11-5. MK-20 Liferaft Markings (Cont)

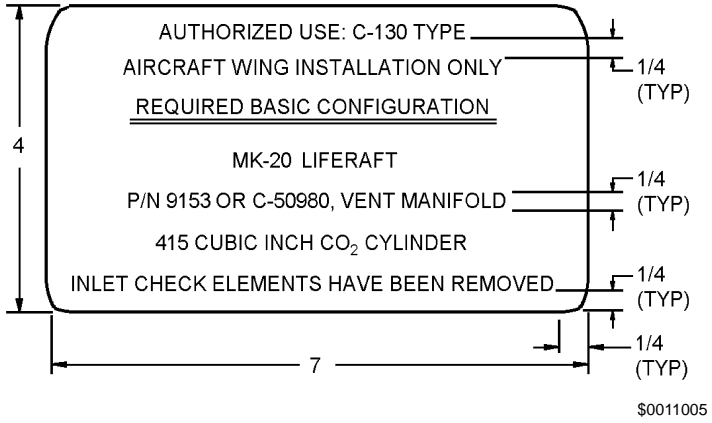
Marking	Location	Letter Height
 <p>AUTHORIZED USE: C-130 TYPE</p> <p>AIRCRAFT WING INSTALLATION ONLY</p> <p><u>REQUIRED BASIC CONFIGURATION</u></p> <p>MK-20 LIFERAFT</p> <p>P/N 9153 OR C-50980, VENT MANIFOLD</p> <p>415 CUBIC INCH CO₂ CYLINDER</p> <p>INLET CHECK ELEMENTS HAVE BEEN REMOVED</p> <p>7</p> <p>4</p> <p>1/4 (TYP)</p> <p>1/4 (TYP)</p> <p>1/4 (TYP)</p> <p>1/4 (TYP)</p> <p>\$0011005</p>	Upper tube, directly above manifold	As shown
<p>Note: Replacement markings shall be stamped or stenciled using waterproof black ink.</p> <p>*Marking located on both upper and lower tubes.</p>		

Table 11-6. MK-20 Case and Container Markings


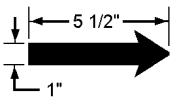
Case/Container	Marking	Location	Letter Height
Carrying Case (wing installation type)	LIFERAFT, TWENTY-MAN MARK 20 SPECIFICATION MIL-L-009131F(WP) MANUFACTURER [applicable number] CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable number] DO NOT USE THIS CASE ON DROPPABLE TYPE RAFT PACKS	Between handle keepers on one side of carrying case Both sides of carrying case	1 inch 1 inch
Carrying Case (droppable type)	LIFERAFT, TWENTY-MAN MARK 20, DROPPABLE USN SPECIFICATION MIL-L-009131F(WP) MANUFACTURER [applicable number] CONTRACT NO. [applicable number] SERIAL NO. [applicable number] GROSS WEIGHT [stencil applicable number]	Between handle keepers on one side of carrying case	1 inch
Carrying Case (droppable type) (Cont)	INFLATE AT THIS END 	Both sides of carrying case at pull handle end	1 inch 
	IF VERTICAL STOWAGE THIS END UP	Both sides of case below arrow	1 inch
	INFLATE OTHER END	End panel opposite pull handle end	1 inch
	TO INFLATE, LIFT FLAP, PULL HANDLE OUT UNTIL FREE	Pull handle flap	1/2 inch
Accessory Container (wing installation)	20 MAN LIFERAFT ACCESSORY CONTAINER ASSY FOR WING INSTALLATION IN KC130F AND C130F AIRCRAFT	Main panel	1 inch
Accessory Container (droppable)	TWENTY-MAN RAFT ACCESSORY CONTAINER DROPPABLE MIL-L-009131F (WP)	Side panel	1/2 inch
Accessory Container (droppable and wing installation)	Each accessory container will be marked with the name of the equipment stored in the container. Refer to table 11-7 .	Main panel	1/2 inch

Table 11-7. LRU-15/A Survival Items

Description	Quantity Required	Reference Number	NIIN	SM&R Code
<u>Packed In Accessory Container</u>				
Desalter Kit, Sea Water, MK2, Type II (Note 10)	10	MIL-D-5531E	00-372-0592	PAOZZ
Sea Dye Marker	8	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal, MK-124 MOD 0 or Signal Kit MK-189 MOD 0 (Note 8)	10 1	— —	01-030-8330 L564-1370-01-418- 2657	— —
Water Storage Bag (Size A)	7	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Note 11)		—	01-124-4543	PAOZZ
w/ MROD	20			
w/o MROD	50			
First Aid Kit, Size A	2	SC-C-6545-IL Vol. #2	00-922-1200	—
Desalinator, Manual Reverse Osmosis (Notes 1 and 11)	1	—	01-313-6086	—
Sunburn Preventative Preparation	3	MIL-S-37800	01-121-2336	PAOZZ
Food Packet, Liferaft	20	MIL-F-15381	01-028-9406	PAOZZ
Bailing Sponge	6	L-S-626	00-240-2555	PAOZZ
Hand Pump	2	MIL-P-8258	00-097-4580	PAOZZ
Combat Casualty Blanket Type I	3	MIL-B-36964	00-935-6665	PA—Z
Hand Generated Flashlight A-9 (Note 2)	1	MIL-F-8209	00-283-9806	PAOZZ
Patch, Mechanical (Note 9)	2	P/N 13202E2870-1 (CAGE 81336)	00-720-8864	—
Flare Gun, MK-79 MOD 0 (Note 8)	2	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or Signal Light (Strobe) SDU-39/N	1	MIL-L-38217	00-067-5209 01-411-8535	PAOZZ
Light, ChemiLuminescent	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Note 3) or Signal Mirror, Type II	1	MIL-M-18371 MIL-M-18371	00-105-1252 01-455-6695 01-455-6671	PAOZZ PAOZZ PAOZZ
Survival Radio (Notes 4 and 5) and/or Radio Beacon AN/URT-33A (Note 4)	As Required As Required	— MIL-B-38401	— 00-160-2136	— PAOGG
Code Card (Note 6)	1	—	—	—

Table 11-7. LRU-15/A Survival Items (Cont)

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Whistle, Type II	1	MIL-W-1053	00-254-8803	PAOZZ
Compass, Pocket, Type MC-1 (Note 7) or Compass, Wrist	1 1	MIL-C-17850 WCC-100	00-515-5637 00-809-5252	PAOZZ PAOZZ
Pocket Knife	1	MIL-K-818C	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	MIL-C-5040	00-240-2154	PAOZZ
<p>NOTES: 1. MROD shall be used in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted.</p> <p>2. Required for Arctic missions; optional otherwise.</p> <p>3. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted.</p> <p>4. Survival radio or radio beacon requirements shall be in accordance with OPNAVINST 3710.7 Series. Following radios apply: Voice-Beacon: AN/PRC-90, AN/PRC-90-2, and AN/PRC-149, Beacon only: AN/URT-33, AN/PRT-5, and AN/PRC-140. The AN/PRC-149 will become the preferred radio when available.</p> <p>5. Ensure battery service life does not expire prior to next scheduled special inspection. Refer to the applicable manual for the installed radio for battery service life.</p> <p>6. Refer to NAVAIR 13-1-6.5.</p> <p>7. Use MIL-C-17850 until stock is depleted, then use WCC-100.</p> <p>8. MK-189 MOD 0 Signal Kit contains 6 MK-124 Day/Night flares and 2 MK-79 MOD 0 flare guns.</p> <p>9. Patch, mechanical, is made in accordance with MS27826-1 size 3 7/8 inches by 2 1/2 inches.</p> <p>10. Authorized for use in Arctic/Antarctic environments.</p> <p>11. MROD should not be used where water temperatures are below 36°F.</p>				

11-33. Inspection of Inflation Assembly (Discharged). To inspect a discharged inflation assembly, proceed as follows:

1. Inspect cylinder markings. Re-mark as required in accordance with paragraph 11-34.

2. Check date of last hydrostatic test. If greater than 5 years, see paragraph 11-43 for disposition.

3. Examine inflation assembly for evidence of corrosion, wear, loose screws, and dents. If damaged or extensive wear is found, replace valve, cylinder, housing, or pull cable. If pull cable is replaced, perform pull cable proof load test in accordance with paragraph 11-23.

4. Recharge assembly in accordance with paragraph 11-46.

11-34. Cylinder Markings. All CO₂ inflation cylinders shall be in black letters 1/4 inch high. Information shall include gross weight, tare weight, and weight of CO₂. In addition, multiplace liferaft cylinders shall be marked with the following information in 1 inch red letters: WARNING - COMPRESSED GAS - DO NOT DROP. Paint and stencil cylinder as required. Weight of CO₂ is 9.14 to 9.26 lbs. Ensure that all markings are included as necessary.

11-35. LEAKAGE TEST. To perform a leakage test, proceed as follows:

CAUTION

Liferaft should not be disturbed during leakage test.

11-36. Test Fixture. As assembled, test fixtures are not stocked in the Supply System; test fixtures must be fabricated to meet the requirements of the schematic shown in [figure 11-4](#). A suggested test fixture consisting of a three, way valve, pressure gage, and suitable adapters for the compartments being tested is shown in [Chapter 3](#).

11-37. Test Procedure. To test liferafts for leakage using test fixture in [Chapter 3](#), proceed as follows:

CAUTION

Ensure that area surrounding liferaft is clear of foreign objects.

1. Ensure that manifold inlet is capped ([paragraph 11-26, step 2](#)) or an empty cylinder is installed, and ensure that manifold vent is in closed position, indicated by vent/shut poppet in up position.

NOTE

Refer to [table 11-8](#) for information regarding inflation pressure and listing of compartments which may be tested simultaneously.

2. Install equalizer tube clamp.

CAUTION

If three-way valve is not used, measuring device valve must be closed when air-feed valves are open.

NOTE

If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

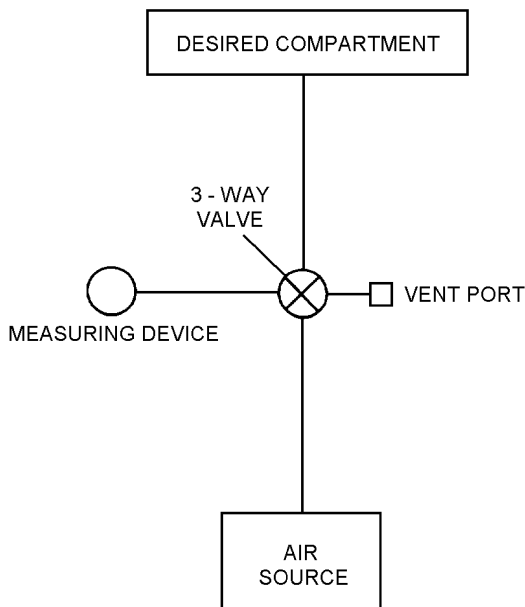


Figure 11-4. Test Fixture Schematic

10110004

3. Open topping-off valve then thread adapter into topping-off valve threads. Open air supply valve and inflate liferaft. Alternately position valve at measuring device, vent and air supply until proper pressure is attained. Refer to [table 11-8](#).

4. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure shall be readjusted, if necessary, to the leakage test pressure. Refer to [table 11-8](#).

5. Disconnect air supply and check for leaks. Ensure that all valves are closed. Record time.

6. Coat area where manifold enters liferaft at Y-connections with soap solution and wiggle manifold assembly. Observe for signs of leakage. If any leak is noted, the liferaft shall be considered beyond repair.

7. Record temperature and barometric pressure and allow raft to remain undisturbed for a minimum of 4 hours.

Table 11-8. LRU-15/A Liferaft Test Pressure

LRU-15/A Compartment	Leakage Test Pressure (psig)	Minimum Pressure (psig)
*Upper Tube	3.0	2.60
*Lower Tube	3.0	2.60
*Floor Support Tube	2.0	1.60
*Compartments may tested simultaneously.		

NOTE

If the raft has been stacked during the 4-hour inspection period remove from stacking and place in a horizontal position on the floor or table in the inspection area and take test pressure reading. In no event shall the pressure in the raft be determined with another raft stacked upon it.

8. At the end of a minimum of 4 hours after the readjustment period in [step 5](#) record test pressure.

NOTE

Steps 9 through 21 shall be performed only after leakage test readings have been recorded.

9. Record temperature and barometric pressure and correct test pressure for any changes in temperature and barometric pressure. Refer to [tables 11-9](#) and [11-10](#).

EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	- 5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057

UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

K0037009

Step 9 - Para 11-37**Table 11-9. Temperature Conversion Chart**

Temperature Difference (Degree F)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.148
9	0.279
10	0.310
Rise in temperature: subtract from gage reading. Fall in temperature: add to gage reading.	

10. If pressure of compartment is below pressure limits in [table 11-8](#), inflate to leakage test pressure and check for leaks, using a soap solution. Mark leaks, rinse with fresh water, and dry with a lint free cloth. Determine repairability in accordance with [paragraph 11-51](#).

11. Remove equalizer clamp and stow in pocket.

12. Apply a small amount of soap solution to manifold, and inspect for leaks. Inspect for damage, excessive wear and corrosion.

13. Apply a small amount of soap solution around topping-off valve and check for leaks.

14. To verify that inlet check elements have been removed from inlet valves, depress manifold poppet and ensure that air escapes. (If air does not escape, refer to [paragraph 11-69](#) for the removal of inlet check elements and for the fabrication of an identification patch.) Reclose vent. Vent shall remain closed until liferaft is installed in aircraft wing compartment.

Table 11-10. Barometric Pressure Conversion Chart

Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)	Press. Diff. (inHG)	Corr. (psi)
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368
Rise in pressure: add to gage reading. Fall in pressure: subtract from gage reading.									

15. Deflate liferaft in accordance with paragraph 11-25.

16. (All Droppable LRU-15/A Liferafts Except LRU-15/A Droppable, Remote Pull) Attach retaining line to neck of cylinder with a bowline knot. Safety tie bowline knot with one turn of size E thread.

17. (LRU-15/A with Manifold) Remove manifold cap or empty cylinder. Rotate manifold coupling nut and check for freedom of movement to ensure that inner locking ring is not binding.

18. (LRU-15/A with Manifold) Ensure that nylon gasket (P/N 1106AS108-3) is not wedged in port between manifold and CO₂ cylinder.

19. Install cylinder valve anti-chafing sleeve.

20. Reinstall properly charged inflation assembly.

21. Tighten coupling nuts to cylinder valve and Y-valve to raft inlet valves to a torque value of 140 to 150 in-lb.

22. Lace cylinder sling closed and snap cover over lacing where applicable.

11-38. RECORDS UPDATING. Make necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

11-39. CLEANING AND SERVICING.

11-40. Cleaning and servicing consists of cleaning the liferaft and containers and/or cases, checking hydrostatic test date on multiplace liferaft CO₂ cylinders, replacement of poppet assembly, replacing the safety disc and washer on inflation valves, recharging CO₂ cylinders and safety-wiring inflation valves.

11-41. CLEANING OF LIFERAFTS. To clean liferafts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint-Free, Type II	MIL-C-85043 NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Solvents are not to be used in the cleaning of liferafts.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

2. Apply cleaning solution to soiled area with a spray or sponge.

3. Allow solution to remain on the surface for several minutes, then agitate with a soft brush or rag.

4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.

5. Dry liferaft with a lint-free cloth and apply a light coating of talc.

11-42. CLEANING OF CONTAINERS AND/OR CASES. Clean in accordance with [paragraph 11-41](#).

11-43. HYDROSTATIC TEST. Inspect CO₂ cylinders used on multiplace liferafts to determine if the previous hydrostatic test was within the last five years. However, a fully charged cylinder (charged to the cylinder gross weight) is considered serviceable, regardless of the last hydrostatic test date, until discharged. If over five year due date for testing, and cylinder has been discharged, proceed with hydrostatic test:

WARNING

Wire-wrapped cylinders must have wire-wrapping removed prior to hydrostatic testing; cylinders passing the hydrostatic test must be rewound prior to placing back in service.

Wire-wrapped cylinders must have letter W at end of part number. Cylinders received without the W at end of part number do not require wire-wrapping.

Materials Required

Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
	-or-	
1	Parts Kit, Valve	ASV710 (CAGE 34009) NIIN 00-999-7662

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man liferafts, have siphon tubes installed.

1. Disconnect the cylinder and valve assembly from the raft. Remove and retain valve for the replacement cylinder.

2. Mark appropriate form "Hydrostatic Test Required" in accordance with OPNAVINST 4790.2 Series and return old cylinder to Supply.

NOTE

Ensure that all CO₂ cylinders received from Supply, except those used on one-man liferafts, have siphon tubes installed.

3. Obtain a replacement cylinder. Before installing valve on cylinder, gently tap inverted cylinder with a small piece of wood. If any rust or other contamination falls from cylinder, do not use that cylinder; draw another cylinder and repeat contamination check.

4. Check for installation of siphon tube.

5. Replace stem in inflation assembly valve if necessary.

- 6. Install a new sealing washer.
- 7. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.
- 8. Charge cylinder and reconnect valve and cylinder to liferaft as appropriate.

11-44. INSPECTION/REPLACEMENT OF INFLATION VALVE POPPET ASSEMBLY. If leakage of CO₂ is from valve discharge port, inspect the valve poppet (P/N ASV-601, NSN 4220-00-507-6667) for worn seat as follows:

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve from a charged CO₂ assembly.

Materials Required

Quantity	Description	Reference Number
1	Washer, Sealing	A128-13 (CAGE 34009) NIIN 00-159-2599
1	-or- Parts Kit, Valve	ASV 710 (CAGE 34009) NIIN 00-999-7662
1	Valve Poppet Assembly	P/N ASV-601, NIIN 00-507-6667

- 1. Remove cylinder from liferaft.
- 2. Remove valve from cylinder.
- 3. Disassemble valve ([Figure 11-5](#)) and inspect poppet for worn seat. Replace poppet assembly if necessary.
- 4. Install a new sealing washer.
- 5. Thread inflation valve onto cylinder and tighten to a torque value of 165 to 175 ft-lb.

11-45. REPLACEMENT OF SAFETY DISC AND WASHER ON INFLATION VALVES. (See [figure 11-6](#).) To replace safety disc and washer on inflation valve assemblies (A-128/871444/IV0303) proceed as follows:

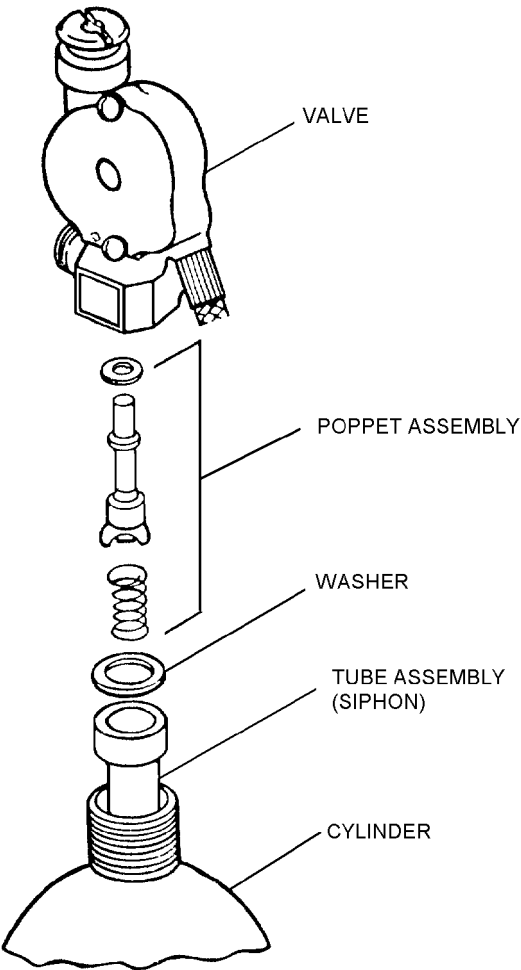


Figure 11-5. Valve Poppet Disassembly

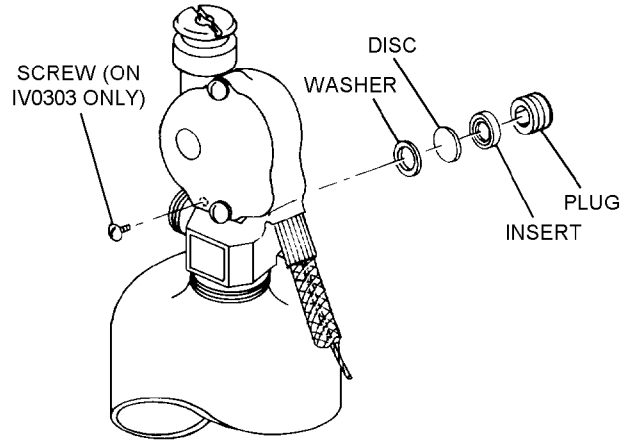
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Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque	—
1	Socket, 5/16 inch	—

WARNING

Before performing any work on inflation valves, ensure that CO₂ inflation assemblies are completely discharged. Do not remove valve or valve safety disc plug from a charged CO₂ assembly.



INFLATION VALVE
P/N A-128, P/N 871444, P/N IV0303

10110006

Figure 11-6. Disassembly of Inflation Valve Safety Disc Assembly

Materials Required

Quantity	Description	Reference Number
1	Repair Kit (Insert, Washer, Disc)	903684 (CAGE 33525) NIIN 00-703-7811
1	Hex Stock, 5/16 x 12 inch Length	

1. Remove cylinder from liferaft.
2. Remove safety disc plug; insert safety disc and washer.
3. Place new washer into inflation valve safety disc orifice.
4. Place new safety disc into inflation valve safety disc orifice.
5. Replace insert and safety disc plug.

NOTE

While tightening the safety disc plug, align insert with plug.

6. Tighten safety plug to 29 ft-lb of torque.

11-46. RECHARGING. To recharge the inflation assembly, proceed as follows (see [figure 11-7](#)):

WARNING

Bottles should be turned in for testing as close to due date as possible. Extending hydrostatic testing by leaving bottle charged may result in corrosion build up on inside of cylinder, which may cause a malfunction during actuation.

When discharging partially charged or overcharged CO₂ cylinders, hold firmly in place with a suitable holding device (vice). Protect CO₂ cylinder from vice jaws with cloth or a suitable substitute. Position cylinders so escaping gas is not directed toward any personnel.

NOTE

Inspect CO₂ cylinders for multiplace life-rafts before recharging. Refer to [paragraph 11-33](#).

Charged inflation assemblies used as spare replacements shall be inspected in accordance with [paragraph 11-32](#) prior to raft installation.

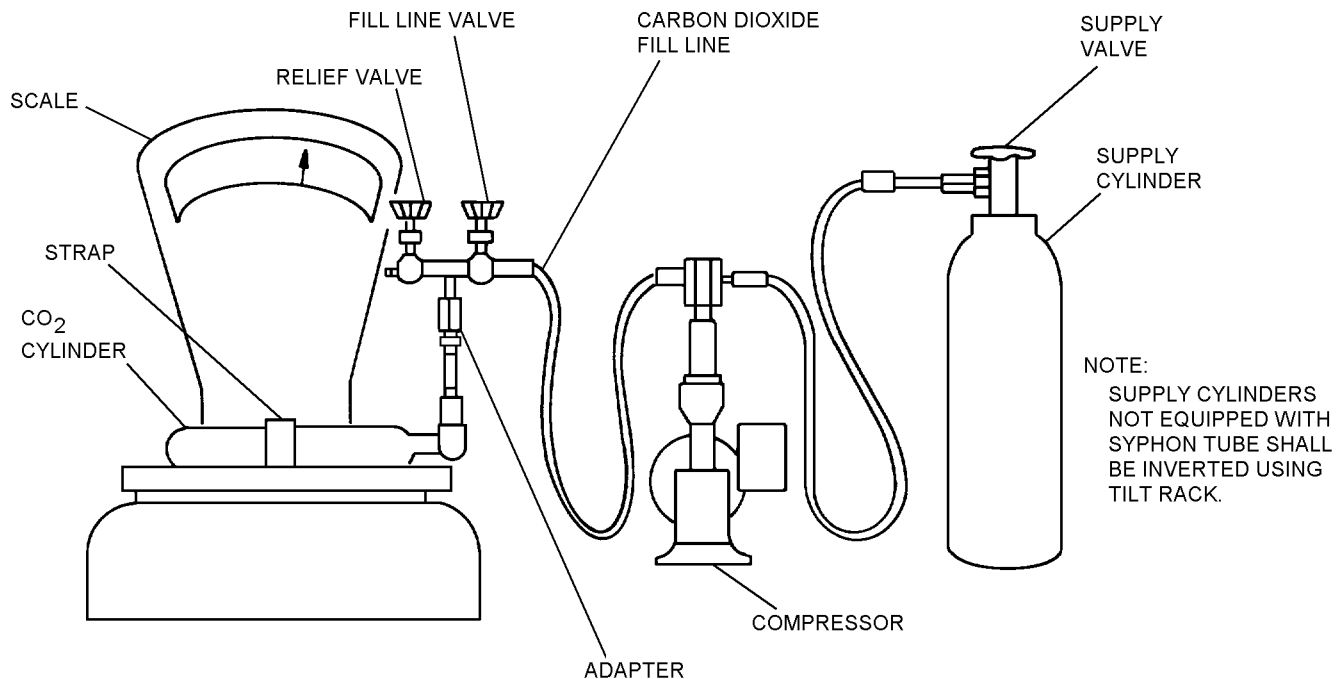
To perform the following filling procedures it is necessary to ensure that CO₂ cylinder is completely discharged.

1. Remove inflation valve cover and rotate cam with screwdriver to open position.
2. Weigh and record tare weight (empty weight cylinder, valve and cable assembly) of inflation assembly. Correct tare weight marking on cylinder if necessary.

NOTE

Supply cylinders not equipped with siphon tube must be inverted during transfer operation. Inverting cylinder allows the liquid to flow from the valve. Supply cylinders with siphon tube (straight pipe) extending from the valve to the bottom of the cylinder can be emptied in the vertical position.

3. Install proper charging adapter on inflation assembly.
4. Secure inflation assembly to weighing pan.
5. Open supply cylinder valve, fill line valve and relief valve to purge fill line. Close fill line valve and relief valve.



10110007

Figure 11-7. Recharging Schematic

NOTE

Ensure fill line is free from contact with any object along entire distance from compressor to charging adapter. If fill line does not hang free, accurate weight readings cannot be obtained.

6. Connect fill line to inflation assembly and zero scale.

NOTE

Proper charge weight is 9.14 to 9.26 lbs.

7. Ensure inflation assembly valve is open.

8. Open fill line valve.

9. Allow carbon dioxide to cascade from supply cylinder into inflation assembly. If gross weight (tare weight plus 9.14 to 9.26 lbs) cannot be reached, start compressor and complete charging. Stop compressor upon reaching proper gross weight.

10. Close fill line valve.

11. Close inflation assembly valve. Open relief valve on fill line valve if applicable.

12. Disconnect fill line from inflation assembly. Remove charging adapter.

13. Measure gross weight of charged inflation assembly.

14. If gross weight of inflation assembly is greater than required, carefully bleed off excess from inflation assembly. If gross weight is less than required, reinstall charging adapter and repeat [steps 5 through 14](#).

15. Reinstall diffuser plug, if applicable.

NOTE

When other cylinders are to be recharged immediately, leave supply cylinder valve open.

16. Close supply and bleed system pressure.

NOTE

Remove cover plate on multiplace liferaft valve assemblies.

17. Immerse inflation assembly in water tank.



If inflation valve leaks from discharge port, inspect inflation valve poppet assembly in accordance with [paragraph 11-44](#).

18. Check for leaks; then remove assembly from tank and dry with an air blast. Wipe assembly with a lint-free cloth.

NOTE

After storage period, inflation assembly should be checked for proper weight.

19. If required, re-mark tare weight, gross weight, charge weight on cylinder.

20. Safety-wire the assembly in accordance with paragraph 11-47.

11-47. SAFETY-WIRING. To safety-wire the inflation assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Torque Meter	—
1	Special Socket	—
1	Dial Push/Pull Gage	DPPH50 (CAGE 11710) or equivalent NIIN 00-473-0108

WARNING

To ensure that proper safety wire is used on liferaft inflation assemblies, a tensile strength test shall be performed on a sample of wire from each spool intended for this use prior to using.

Materials Required

Quantity	Description	Reference Number
As Required	Wire, Aluminum, 0.032 inch Diameter, Temper 0	QQ-A-225/1 NIIN 00-595-8200
2	Screw, Brass	MS35273-2 NIIN 00-720-8657
2	Washer, Lock	MS35333-10 NIIN 00-011-5551
As Required	Seal, Lead	NIIN 00-598-3427
1	Pin, Steel	—

1. Secure one end of a 12-inch sample of aluminum wire (0.032-inch diameter) to a stationary support.

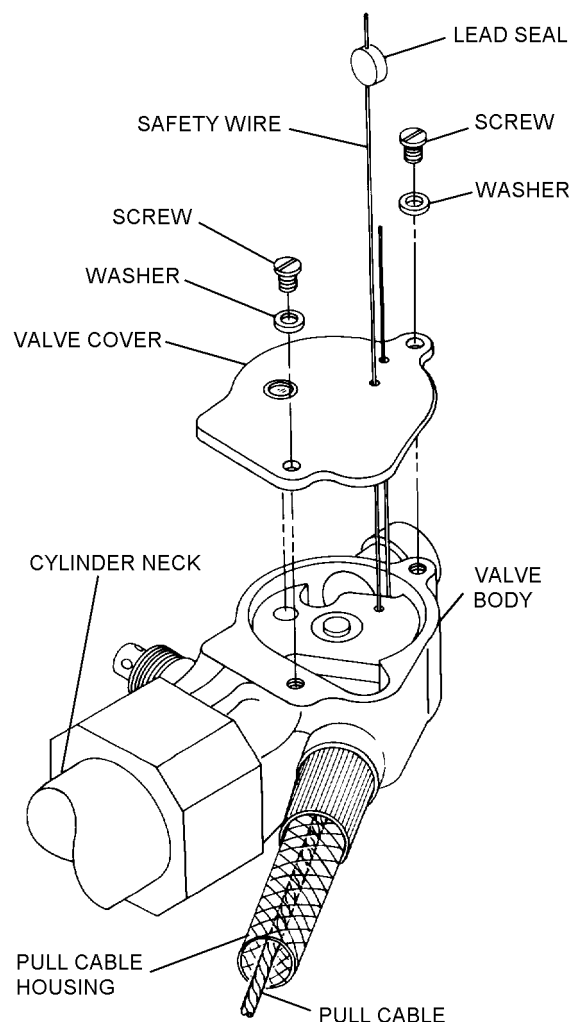
2. Attach opposite end to pull scale; then apply a pull force.

3. Remove valve cover plate and ensure correct routing of pull cable. See [figure 11-8](#).

NOTE

Ensure that pull cable used for multiplace liferafts has been proof load tested IAW [paragraph 11-23](#).

4. Route safety wire as shown. Use 0.032-inch diameter aluminum wire.



TYPICAL INSTALLATION OF SAFETY WIRE

Step 4 - Para 11-47

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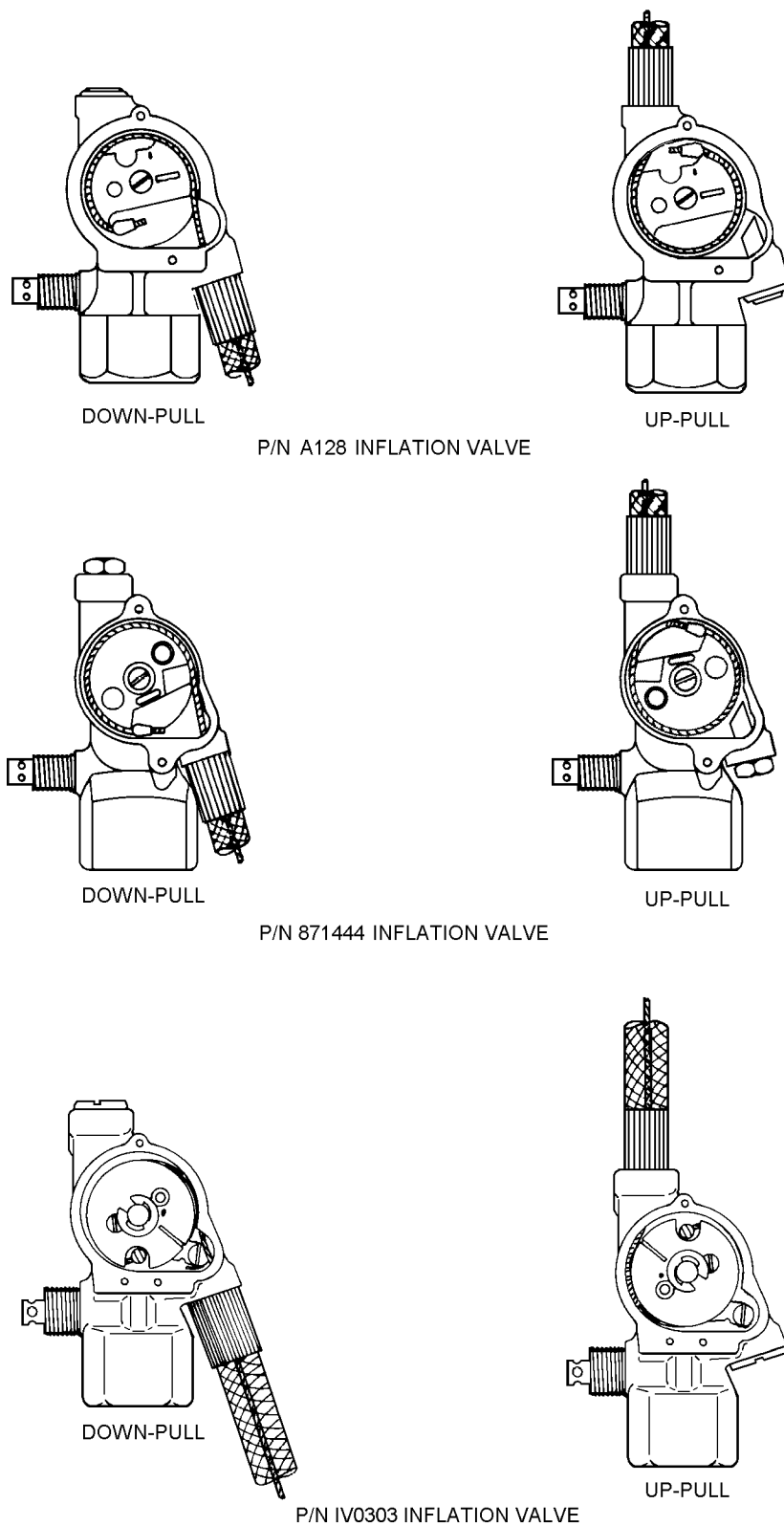


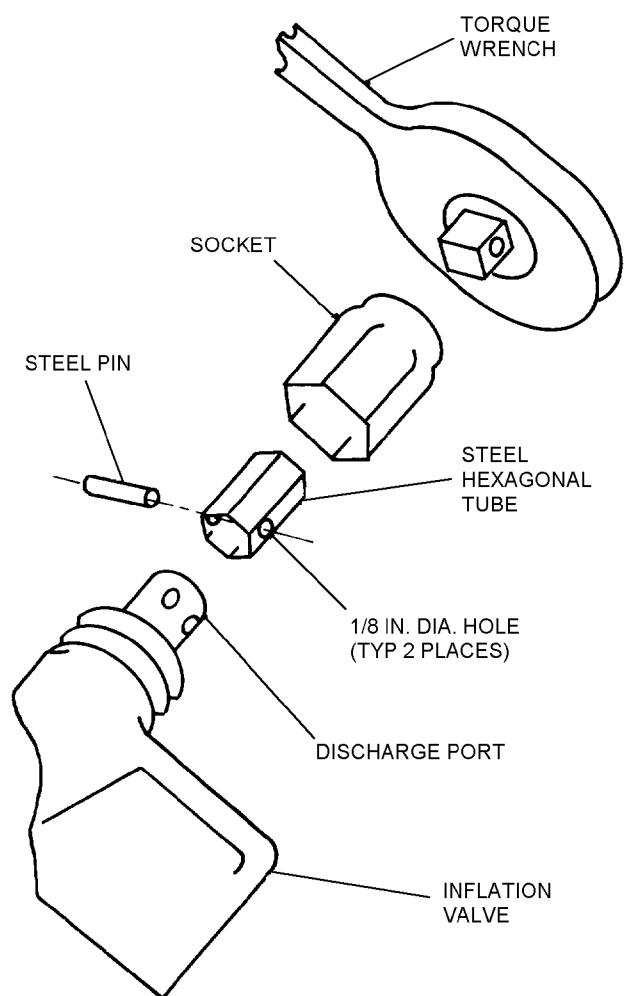
Figure 11-8. Routing of Multiplace Liferaft Pull Cable

10110008

5. Replace valve cover. Twist ends of safety wire to achieve maximum tautness and crimp lead seal. Ensure that pull cable is properly installed. Green dot should be visible in valve cover window.

6. Examine inflation valve to ensure the presence of screw and lockwasher.

7. Tighten discharge port to a torque valve of 60 ± 5 in-lb.

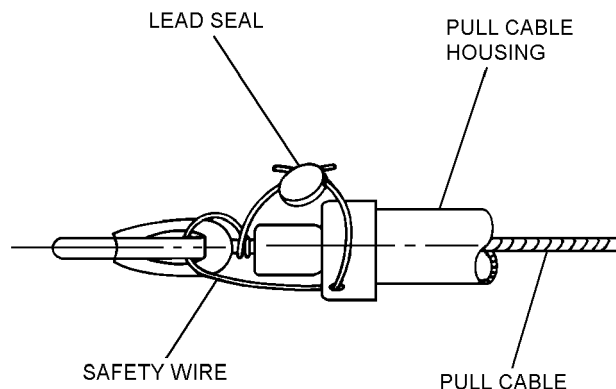


Step 7 - Para 11-47

NOTE

Multiplace liferafts used in aircraft wing compartments shall be safety-wired according to applicable aircraft maintenance instructions.

8. Safety-wire pull cable to pull cable housing as shown. Use 0.032-inch diameter aluminum wire on all liferafts.



TYPICAL REMOTE PULL CABLE SAFETY WIRING

K0047008

Step 8 - Para 11-47

9. If inflation assembly is to be stored, attach a red tag with the following instructions printed in ink: **WARNING: WEIGH INFLATION ASSEMBLY BEFORE INSTALLING ON LIFERAFT. DO NOT INSTALL IMPROPERLY CHARGED CYLINDER OR IMPROPERLY SAFETY-WIRED INFLATION VALVE.**

11-48. REPAIRS/REPLACEMENT.

11-49. This section contains instructions for the repair or replacement of various components or subassemblies of the LRU-15/A liferaft to ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for minor parts which are defective, corroded or worn and require replacement are included in the applicable paragraph of this section. Otherwise, refer to [Section 11-4](#). All repairs shall be documented by making necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

11-50. Replacement of easily removed assembly components such as CO₂ inflation valves are authorized in addition to repair and replacement procedures documented in this section. The liferaft shall be sub-

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jected to a functional and leakage test each time CO₂ inflation valves are removed and replaced for any reason, and each time inflation valve gaskets are replaced.

11-51. DETERMINATION OF REPAIRABILITY. Liferrafts shall be considered beyond repair for any of the following reasons:

- 1. Porous fabric areas on tubes.
- 2. Split or open tube seams.
- 3. Leakage test failure resulting from other than cut, tear, or puncture.
- 4. Damaged, malfunctioning, excessively worn, or corroded inlet valve, manifold assembly or oral inflation tube, as applicable.
- 5. Damaged, malfunctioning, or excessively corroded topping-off valve that cannot be corrected by replacement of topping-off valve opening insert and washer.
- 7. Extensively damaged floor.
- 8. Holes or abrasions exceeding 2 inches in length or diameter in pneumatic compartment.
- 9. Deterioration of the rubberized fabric caused by oil, grease, or any other foreign substance.
- 10. Deterioration of the rubberized fabric caused by a heavy mildewed condition.
- 11. Opening of air retaining seams for internal repair.
- 12. Rips, tears, or punctures in the pneumatic compartments which exceed 2 inches.
- 13. In the judgement of a competent inspector, requiring excessive repair.

11-52. CEMENTING LIFERAFTS. All cementing of liferafts shall be performed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620 NIIN 00-243-9401

Materials Required

Quantity	Description	Reference Number
1	Disposable Brush	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
-or-		
As Required	Methyl Ethyl Ketone, (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Do not use toluene or MEK near open flames, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.



Use only Polychloroprene adhesive and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-15/A Liferaft assemblies.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Toluene or MEK must be applied vigorously to liferaft material over three years old in order to reactivate the material prior to cementing. Pigment from the material coloring staining a cloth rubbed over the treated surface will indicate the material has been reactivated. Adhesive shall be applied immediately after the surface has dried.

1. Clean both surfaces to be cemented with four applications of toluene or MEK. Apply toluene or MEK with back-and-forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow areas to dry between applications.

2. Prepare cement and accelerator mixture. Prepare only enough mixture for 8 hours, as this is the effective active period for the mixture. Dispose of any remaining mixture at this time.

3. Using a disposable brush, apply adhesive to completely cover surfaces to be cemented. Use long one-directional strokes and complete each surface before adhesive becomes tacky as the brush may pull tacky adhesive from the surface. Allow to dry for ten minutes.

4. Apply a second coat of adhesive as in [step 3](#). Use brush strokes perpendicular to the original direction.

5. When second coat of adhesive has become tacky, place pieces together. If cemented area is a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden roller.

6. Allow adhesive to cure a minimum of 48 hours.

7. Dust area with talc.

11-53. PATCHING LIFERAFTS. To patch inflatable survival equipment, select color to approximately match item to be patched, and proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Cloth, Laminated, Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
-or-		
	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829

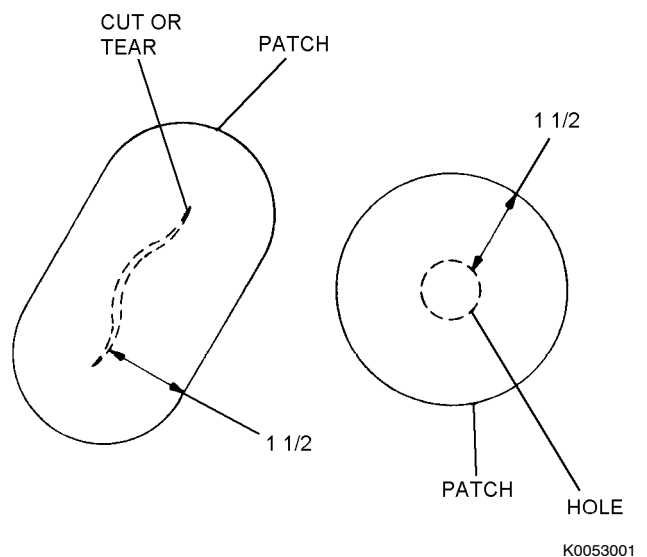
Materials Required (Cont)

Quantity	Description	Reference Number
-or-		
	Cloth, Laminated, Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489



Use only Polychloroprene adhesive and Polychloroprene-coated cloth and patches on Polychloroprene-coated LRU-15/A Liferaft assemblies.

1. Cut a rounded patch 1 1/2 inches larger than the damage on all sides.



Step 1 - Para 11-53

2. Scallop edges of patch if it is larger than 5 inches in diameter.

- 3. If damaged area in floor is larger than 1 inch, patches shall be applied to both sides.
- 4. Center patch over damage and trace on outline of patch on fabric.
- 5. Cement patch to damaged area in accordance with [paragraph 11-52](#).
- 6. Dust area with talc.
- 7. Perform a leakage test.

11-54. RECEMENTING OR REPLACING SEAM TAPES. This repair shall be performed only if a flotation tube does not leak, that is, if only the outer seam tape is loose, or if the seam does not seal a flotation tube. To recement or replace a seam tape, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Tape, Rubberized, Var. T (Specify Color) 1 1/4 inch width	—
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589

NOTE

Seam separation in floors and seats may be repaired provided safety and flotation capabilities are not compromised. Exercise sound judgement in determining whether such repairs are within local capabilities. All cementing shall be performed in accordance with [paragraph 11-52](#).

- 1. If tape is present and undamaged, recement tape to liferaft.
- 2. If tape is missing, measure and fit a replacement tape to area and cement in place. Overlap other seams a minimum of 1 inch.

WARNING

Do not use toluene or MEK near open flame, heat, or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.

NOTE

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

- 3. If tape is damaged, peel damaged tape from liferaft. Apply toluene or MEK only as needed to loosen tape. Trim damaged tape and replace with new tape. Overlap other seam tape a minimum of 1 inch.
- 4. Perform leakage test.

11-55. SEA ANCHOR/MOORING LINE REPLACEMENT. To replace worn or damaged sea anchor or mooring line, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
1	Sea Anchor, Type I, Size 3	MIL-A-3339
As Required	Cord, Nylon Type III	MIL-C-5040 NIIN 00-240-2146

- 1. (Complete Assembly Replacement) Secure free end of mooring line to survivor holding handle nearest sea anchor pocket with bowline knot followed by an overhand knot.
- 2. (Mooring Line Replacement Only) Sear both ends of a 26-foot length of MIL-C-5040 Type III nylon cord. Secure one end to sea anchor bridle, and other end to survivor holding handle nearest sea anchor pocket with bowline knot followed by an overhand knot.

■ 11-56. INSPECTION RECORD PATCH.**NOTE**

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life-

rafts. The requirement for all other record documentation remains unchanged. The reason for this change is that most Inspection Record Patches are unreadable, and the packer's and inspector's names, including the type of inspection (leak/functional), are documented on Aviation Crew Systems Records.

Figure 11-9. Deleted

11-57. REPLACEMENT OF LOCKING CONES (LIFERAFT CASES). To replace damaged locking cones on liferaft cases, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nylon 3-Cord	V-T-295
As Required	Cone, Locking	NIIN 00-095-0075-LX

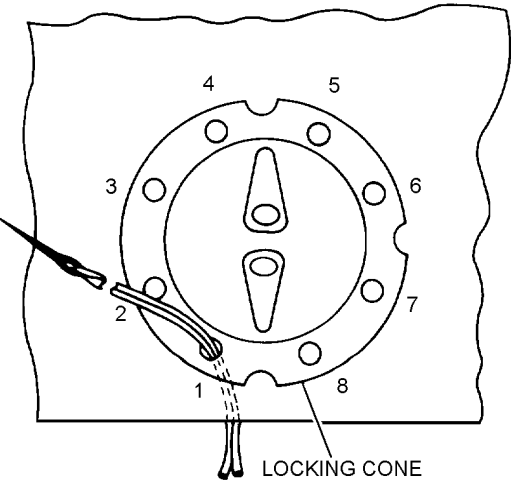
1. Cut and remove tacking holding damaged cone to liferaft case. Remove damaged cone.

NOTE

If fabric supporting locking cone is damaged, fabricate and install a reinforcing patch on inside of case.

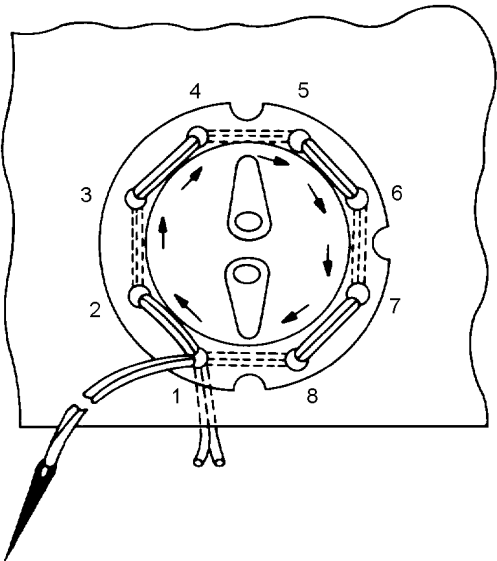
2. Position new locking cone in exact location of damaged or missing cone. Ensure locking pin hole in apex of cone is properly aligned.

3. Push needle, threaded with waxed nylon 3-cord (V-T-295) doubled, up through panel and through hole 1 in locking cone. Pull needle and thread through hole until approximately three inches of thread remains on underside of panel.



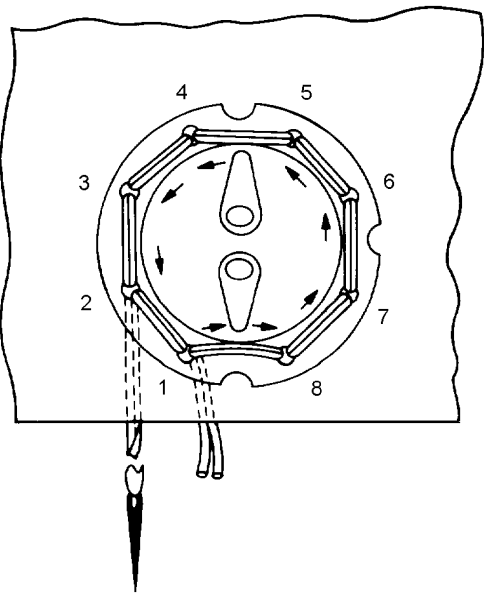
Step 3 - Para 11-57

4. Working clockwise, pass needle down through hole 2, up through hole 3. Continue until all holes are threaded, and needle passes up through hole 1. Take up all slack in thread.



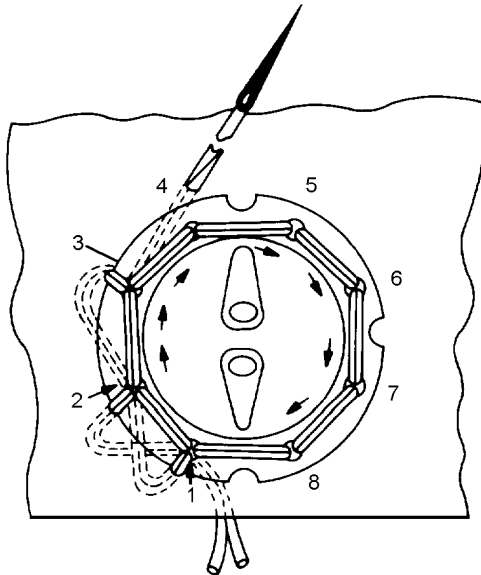
Step 4 - Para 11-57

5. Working counterclockwise, pass needle down through hole 8, up through hole 7. Continue until needle passes down through hole 2. Take up all slack in thread.



Step 5 - Para 11-57

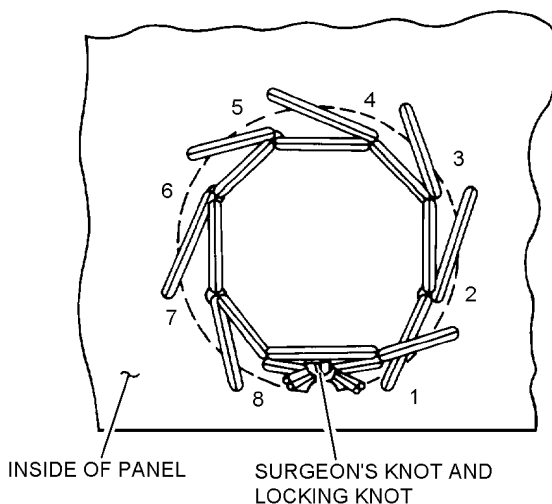
6. Pass needle up through panel at outside edge of cone directly adjacent to hole 1. Working clockwise, pass needle down through hole 1 and up through panel adjacent to hole 2, then down through hole 2. Continue stitching in this manner until needle passes down through hole 8. Take up all slack in thread.



Step 6 - Para 11-57

K0057006

7. Tie ends of thread on inside of panel with surgeon's knot followed by a square knot. Trim thread ends 1/4 inch from knot.



Step 7 - Para 11-57

K0057007

11-58. RELOCATION OF RETAINING LINE INSTRUCTION TAG. To relocate retaining line instruction tag, proceed as follows:

Materials Required

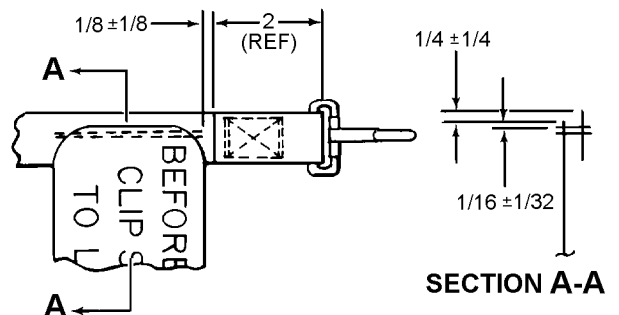
Quantity	Description	Reference Number
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

1. Remove the instruction tag from the snaphook.

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

2. Position instruction tag on retaining line and attach using two rows of stitches.



Step 2 - Para 11-58

K0058002

11-59. SOLDERING OF SNAPHOOK SPRING LATCH ON REMOTE ACTUATOR ASSEMBLY.

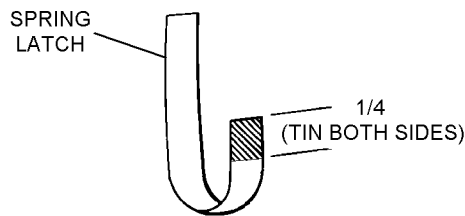
To solder the snaphook spring latch used on remote actuator assemblies, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Solder, Type AR	QQ-S-571

NAVAIR 13-1-6.1-1

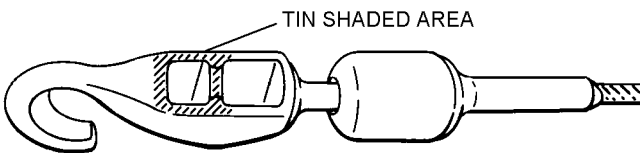
- 1. Remove pull cable from remote actuator assembly.
- 2. Remove spring latch from snaphook.
- 3. Using soft solder, tin both sides of spring latch 1/4 inch from end of hook.



Step 3 - Para 11-59

K0059003

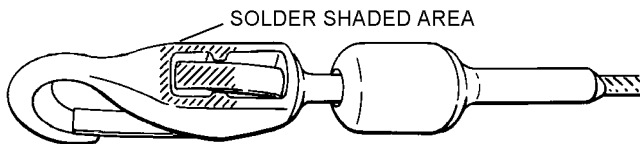
- 4. Using soft solder, tin snaphook.



Step 4 - Para 11-59

K0059004

- 5. Reinsert spring latch into snaphook and soft solder, securing spring latch in place.



Step 5 - Para 11-59

K0059005

- 6. Subject entire pull cable to a 50-lb pull test.

11-60. FABRICATION OF PAINTER LINE POUCH. Painter lines shall be installed on all multi-place liferafts. To fabricate the painter line pouch, proceed as follows:

Materials Required

Quantity	Description	Reference Number
5 x 20 inches	Leatherette, Class 2 or Herculite No. 80, Grey	CCC-A-700
53 inches	Tape, Pile, 3/4 inch	MIL-F-21840
41 inches	Tape, Hook, 3/4 inch	MIL-F-21840
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884
1	Snaphook, Wire Body, Fixed Loop Eye, Flat Spring Closure, With Retainer	MIL-S-43770/1-CWBC1
60 feet	Cord, Nylon, Type I	MIL-C-5040 NIIN 00-240-2154

NOTE

All stitching shall be done with size E nylon thread (V-T-295, Type II), using 8 to 10 stitches per inch.

- 1. Cut and stitch hook and pile tape along edge of material. See figure 11-10.
- 2. Stitch two 9-inch lengths of hook tape 1 1/4 inch from sides. See figure 11-10.

NOTE

Stitch pile tape on one end only.

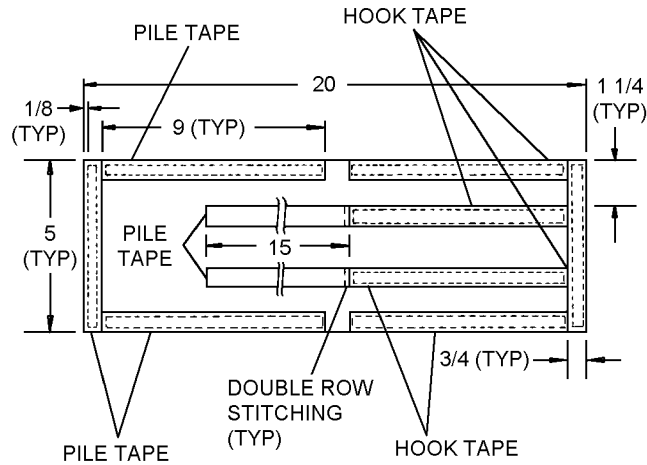


Figure 11-10. Painter Line Pouch

10110010

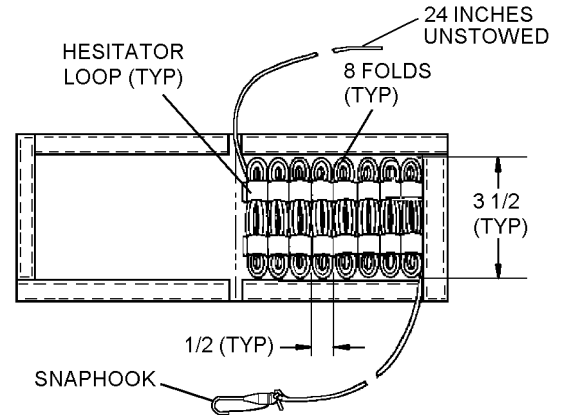


Figure 11-11. Stowed Painter Line

10110011

3. Position face up a 15-inch length of pile tape at inner end of each inside strip of hook tape. Secure inner end of each pile tape to material with double row of stitching. See [figure 11-10](#).

4. Form 1/2-inch wide hesitator loops, 1/8 inch apart. Press hook and pile tape together between loops. See [figure 11-11](#).

5. Stow painter line, making 3 1/2-inch bights, placing 8 folds in each hesitator loop. See [figure 11-11](#).

6. Leave 24 inches of line unstowed at each end for securing painter line to liferaft and aircraft. See [figure 11-11](#).

7. Fold material in half, forming pouch, and leave unstowed ends outside pouch. Press hook and pile tape together.

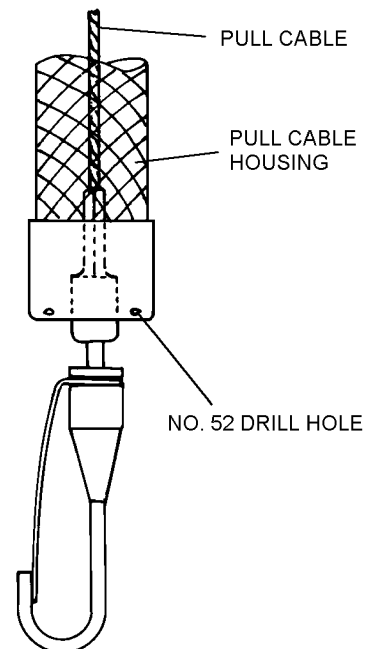
8. Attach snaphook to end of unstowed painter line extending from open end of pouch with a bowline knot.

11-61. DRILLING HOLES IN P/N A128-RT-1. To drill holes in P/N A128-RT-1, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Using a no. 52 drill, drill two holes in pull cable housing.



Step 1 - Para 11-61

K0061001

2. Safety-wire pull cable housing in accordance with [paragraph 11-47](#).

11-62. DRILLING HOLES IN P/N IV0303 (VEE Mfg.) INFLATION VALVE. To drill holes in P/N IV0303 (VEE Mfg.) inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.
2. Remove cover plate and plastic dust shield from valve.
3. Using a no. 52 drill, drill two holes in cover plate and plastic dust shield. See [figure 11-12](#).
4. Remove cam screw from sheave assembly.

WARNING

- Care must be taken not to rotate cam.
5. Remove sheave assembly.
 6. Carefully remove tru-arc ring from stem on valve body.
 7. Remove valve sheave from valve body.
 8. Using a no. 52 drill, drill a hole at a 60° angle in valve sheave. See [figure 11-12](#).

NOTE

Section line B-B through the center of the screwdriver slot and the center of the screw hole. A starter hole will be necessary to seat the drill, prior to drilling the angled hole.

CAUTION

Valve cover plate is not interchangeable between manufacturers.

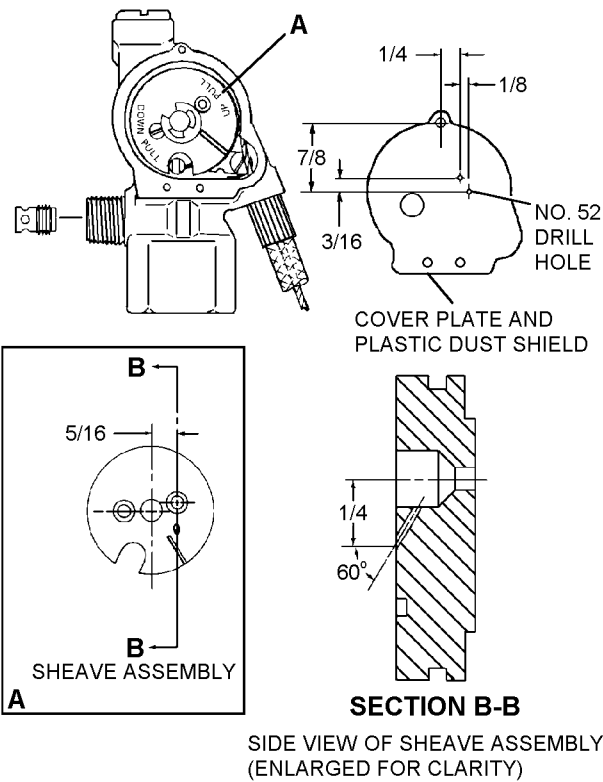


Figure 11-12. Drilling IV0303 Inflation Valve

10110012

9. Install valve sheave, tru-arc ring, release cable, cam screw, plastic dust shield, and cover plate. See [paragraph 11-47](#) for proper safety-wiring.

10. Connect inflation valve to manifold.

11-63. DRILLING HOLES IN P/N A128 INFLATION VALVE. To drill holes in P/N A128 inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.
2. Remove cover plate from valve.

3. Using a no. 52 drill, drill two holes in cover plate. See [figure 11-13](#).

4. Remove release cable from around valve.

WARNING

Do not rotate cam or depress poppet stem.

5. Remove valve sheave from valve.

6. Using a no. 52 drill, drill a hole at a 23° angle in the valve sheave. See [figure 11-13](#).

7. Install valve sheave, cable, and cover plate. See [paragraph 11-47](#) for proper safety-wiring.

8. Connect the inflation valve to manifold.

11-64. DRILLING HOLES IN P/N 871444 INFLATION VALVE. To drill holes in part number 871444 inflation valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Drill, No. 52	—

1. Disconnect inflation valve from manifold.

2. Remove cover plate from valve.

NOTE

Position of holes depends on type of pull used (up-pull or down-pull).

3. Using a no. 52 drill, drill two holes in cover plate. See [figure 11-14](#).

4. Remove release cable from around valve sheave.

WARNING

Do not rotate cam or depress poppet stem.

5. Remove valve sheave from valve.

6. Using a no. 52 drill, drill a hole at an 18° angle in valve sheave. See [figure 11-14](#).

7. Install valve sheave, cable and cover plate. See [paragraph 11-47](#) for proper safety-wiring.

8. Connect inflation valve to manifold.

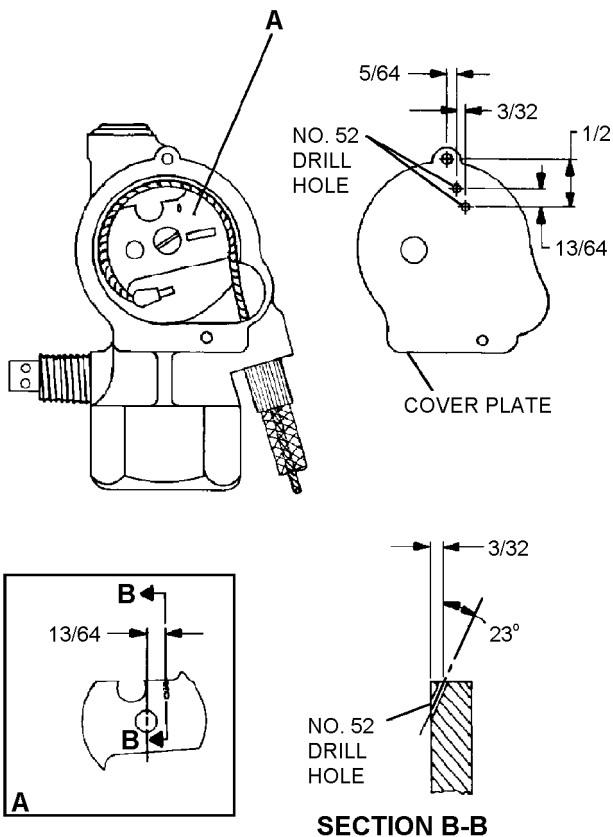


Figure 11-13. Drilling A128 Inflation Valve

10110013

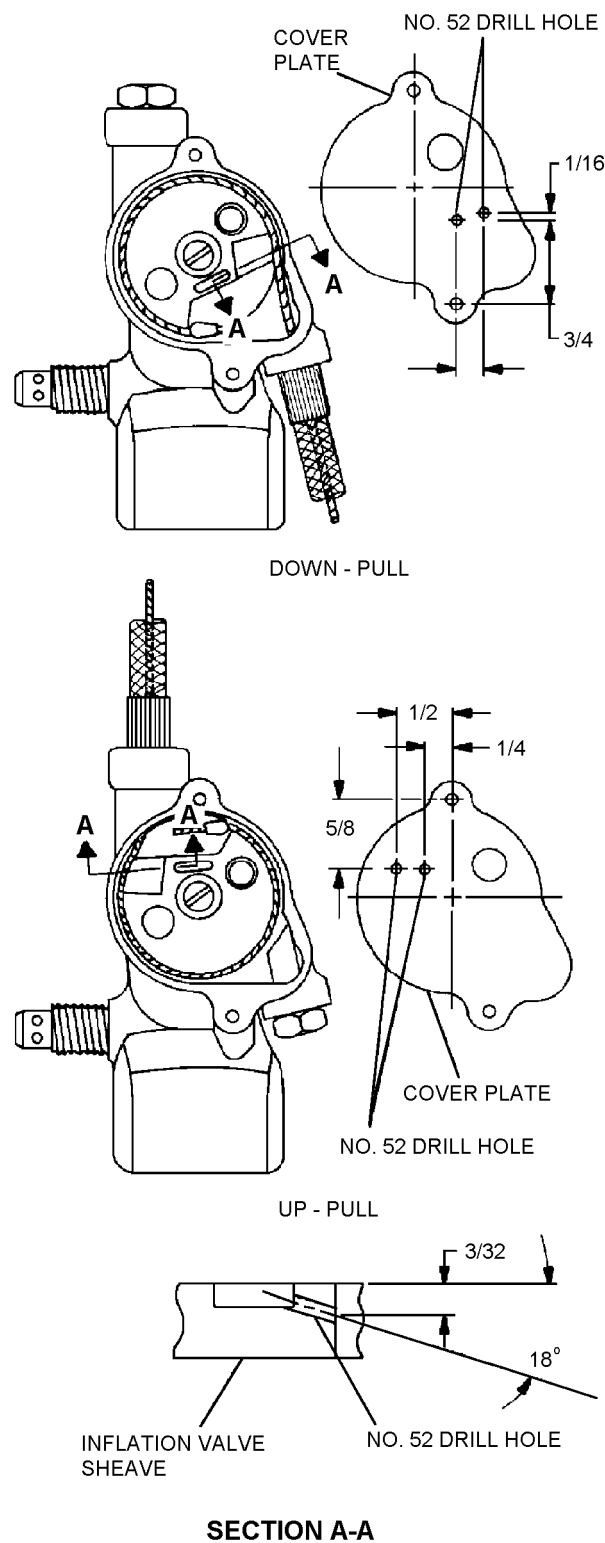


Figure 11-14. Drilling 871444 Inflation Valve

10110014

11-65. FABRICATION OF CYLINDER VALVE ANTI-CHAFING SLEEVE. To fabricate a cylinder valve antichafing sleeve, proceed as follows:

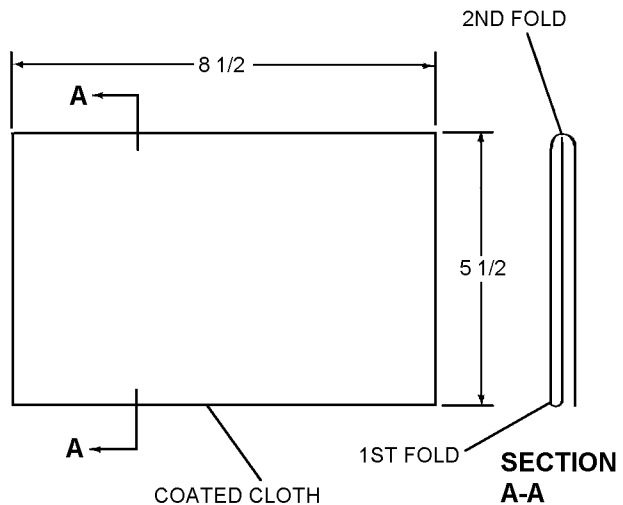
Materials Required

Quantity	Description	Reference Number
16 1/2 x 8 1/2 inches	Cloth, Laminated Var. D, Blue	MIL-C-23070 NIIN 00-132-5009
	-or-	
	Cloth, Laminated Var. C, Orange	MIL-C-23070 NIIN 00-081-5829
	-or-	
	Cloth, Laminated Var. C, Yellow	MIL-C-23070 NIIN 00-926-6489
1	Punch, Cutting, Type I, Class B, Style 1, Size 13	GGG-P-833A NIIN 00-180-0927
As Required	Thread, Nylon, Type II, Size E	V-T-295 NIIN 00-204-3884

NOTE

All stitching shall be done with size E thread, 6 to 10 stitches per inch.

1. Make two folds in the nylon rubber-coated cloth, each fold being 5 1/2 inches as shown.

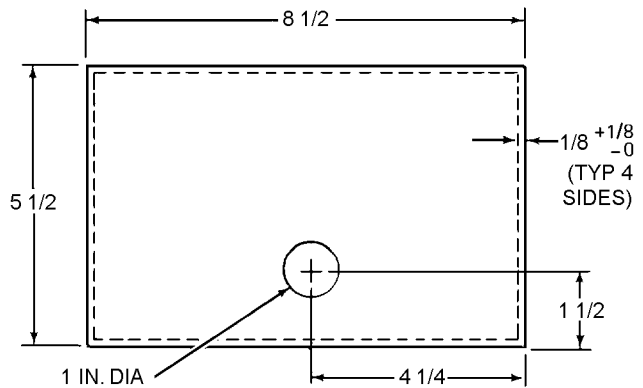


Step 1 - Para 11-65

K0065001

2. Sew a 1/8-inch inboard border row of stitching around the perimeter of the assembly.

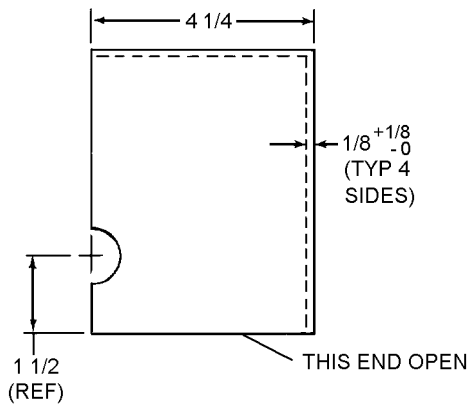
3. Position assembly on cutting board and punch a 1-inch diameter hole through all three layers of material.



Step 3 - Para 11-65

K0065003

4. Fold assembly in half and sew a 1/8-inch row of stitching inboard from edge on end and side.



Step 4 - Para 11-65

K0065004

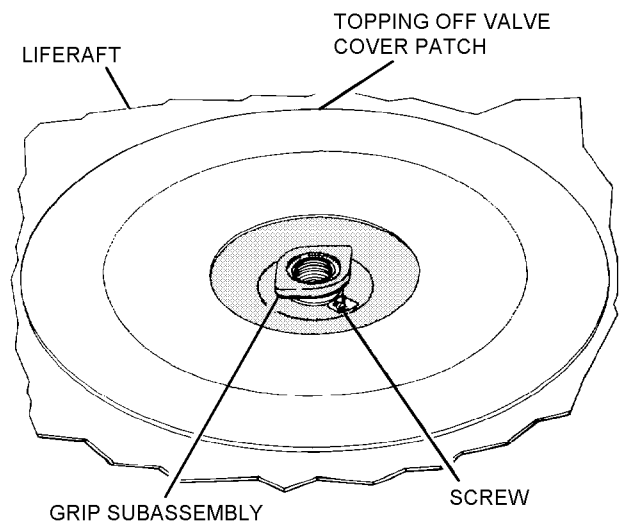
11-66. REPLACEMENT OF TOPPING-OFF VALVE. To replace a damaged or corroded topping-off valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Grip Subassembly (See Note)	MS22054-3
1	Washer (See Note)	MS22054-7
1	Screw (See Note)	MS22054-9
As Required	Applicator, Wood, Cotton-tipped	GGA-616D
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Adhesive, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913

Note: This component is part of parts kit, P/N 1106AS110-1 (CAGE 30003) NIIN 01-128-5331.

1. Ensure that grip subassembly is in closed position.



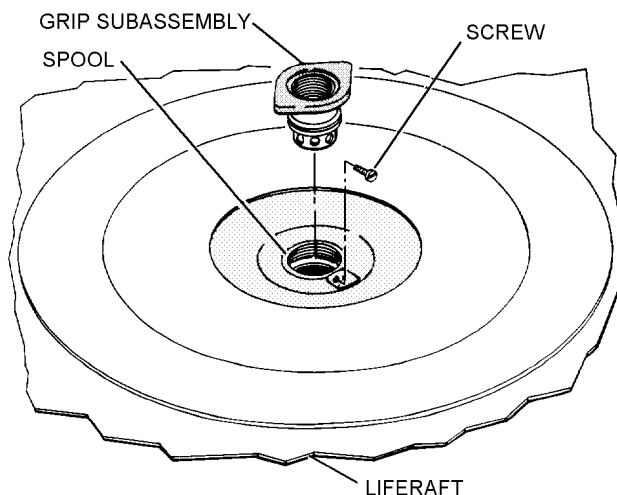
Step 1 - Para 11-66

K0066001

NAVAIR 13-1-6.1-1

2. Turn grip subassembly clockwise approximately 1 1/2 turns.

3. Remove screw from side of spool.



Step 3 - Para 11-66

K0066003

4. Unscrew and remove grip subassembly from spool.

WARNING

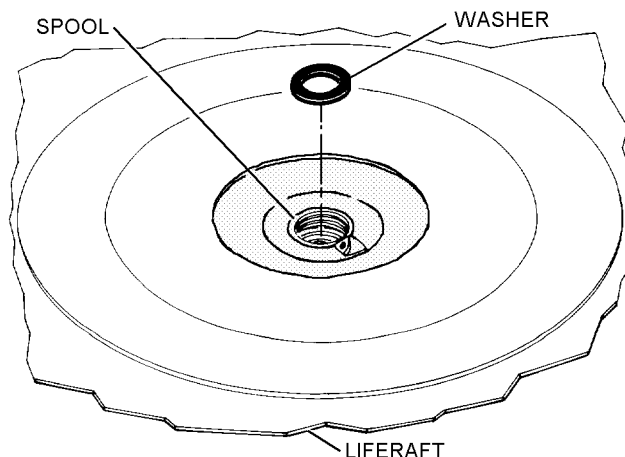
Do not use toluene or MEK near open flame, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in well-ventilated area.

CAUTION

To avoid damaging valve threads, care should be taken when inserting instrument to remove washer.

Use only enough toluene to loosen washer. Ensure that no toluene or MEK passes through bottom of valve opening. Wipe excess from liferaft as rapidly as possible.

5. Remove washer located in bottom of spool. If necessary, use toluene or MEK to assist in removal.



K0066005

Step 5 - Para 11-66

NOTE

Ensure that no toluene, MEK, or congealed masses of adhesive enter the opening at bottom of spool.

Toluene shall be the primary solvent used in this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

6. Insert an applicator or similar instrument dipped in toluene or MEK into spool and swab washer seating area to remove old adhesive.

7. Apply adhesive, using an applicator or similar instrument, to washer seating area on inside bottom of spool.

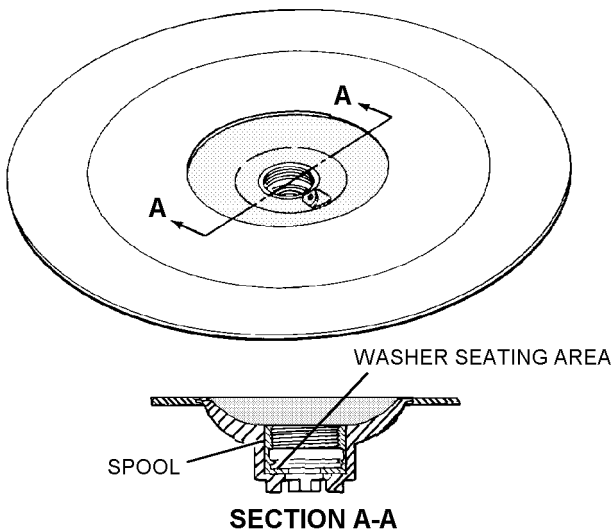
CAUTION

Do not use sharp instrument to insert washer into seating area.

NOTE

Ensure that the washer is properly seated on to bottom of spool and that the threads and opening are free of adhesive.

8. Insert washer into washer seating area.



Step 8 - Para 11-66

K0066008

9. Screw grip subassembly counterclockwise into spool until it closes.

10. Turn grip subassembly clockwise approximately 1 1/2 turns.

11. Tighten screw into side of spool until snug.

12. Ensure proper operation of topping-off valve.

13. Perform leakage test.

11-67. FABRICATION OF LIFERAFT CONTAINER FOR C-130 AIRCRAFT. To fabricate a container for the LRU-15/A for packaging into the wingwell of a C-130 aircraft, proceed as follows:

Materials Required

Quantity	Description	Reference Number
3 1/2 yards	Cloth, Coated Nylon Type II, Class 3	MIL-C-20696
17 feet 1 3/4 inches wide	Webbing, Nylon, Size E	MIL-W-4088
As Required	Thread, Nylon, Size E	V-T-295
14	Grommet, Metallic Size O	MS20230-10
8	Button	MS27980-1N
8	Socket	MS27980-6N
8	Stud	MS27980-7N
8	Eyelet	MS27980-8N
4	D-Ring	MS22046-1

1. Lay out and cut the following panels from coated cloth (MIL-C-20696) as shown in figures 11-15 and 11-16.

a. One Body Panel 43 inches x 80 5/8 inches (figure 11-15).

b. Two Side Panels 23 3/4 inches x 38 3/8 inches (figure 11-18).

c. One Inspection Card Pocket 6 inches x 10 inches (figure 11-18).

2. Cut and sear the following pieces of 1 3/4-inch nylon webbing (MIL-W-4088) as shown in figures 11-16 and figure 11-19.

a. 2 each - Lift Webbings 68 inches long (figure 11-16).

b. 1 each - Stiffener 26 inches long (figure 11-16).

c. 2 each - Guides 5 1/4 inches long (figure 11-16).

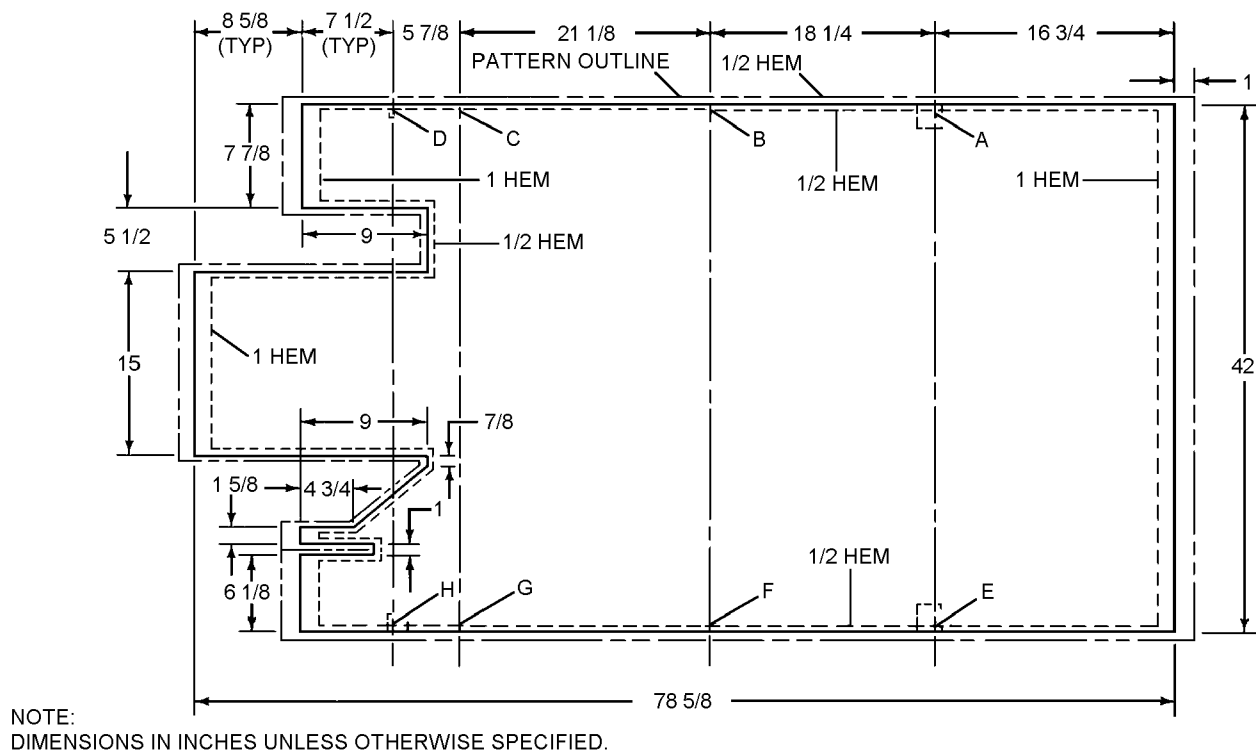


Figure 11-15. Panel Body Dimensions

10110015

d. 2 each - Tie Downs 7 inches long (figure 11-16).

e. 4 each - Reinforcements 4 1/4 inches long (figure 11-19).

NOTE

The following describes fabrication of a liferaft container for the left wing of the aircraft. A container for the right wing of the aircraft is built exactly opposite.

3. From a 43 inch x 80 5/8 inch piece of coated cloth, fabricate a body panel as shown in figure 11-15. Outermost line allows for 1/2 and 1-inch hems. Cut material so that it will conform to the inside line dimensions shown, after hems are made. First, make 1/2-inch hems, stitching 3/8 inch in along new edges, then make 1-inch hems, stitched 7/8 inch in along new edges, overlapping 1/2-inch hems at corners. Locate and identify marker points A through D and E through H, for ease of assembly with side panels.

NOTE

Unless otherwise specified, all machine stitching shall be in accordance with ASTM-D-6193, type 301 lockstitch, 8 to 10 stitches per inch. Binding tape may be used as an optional method of finishing edge.

4. Take the two 68 inch lengths of lift webbing and attach a D-ring to each end, as shown in figure 11-16, Section A-A. Position these webbing assemblies on panel body and stitch in place as shown. Take 26 inch length of stiffener webbing and position as shown, overlapping two previously attached lengths of lift webbing and stitch in place as shown, Section B-B. Cut off excess webbing.

5. Install size "O" grommet assemblies (MS20230) into each of the two 7-inch tie down webbings (Section C-C). Position these assemblies onto body panel as shown and stitch in place as shown in Section C-C.

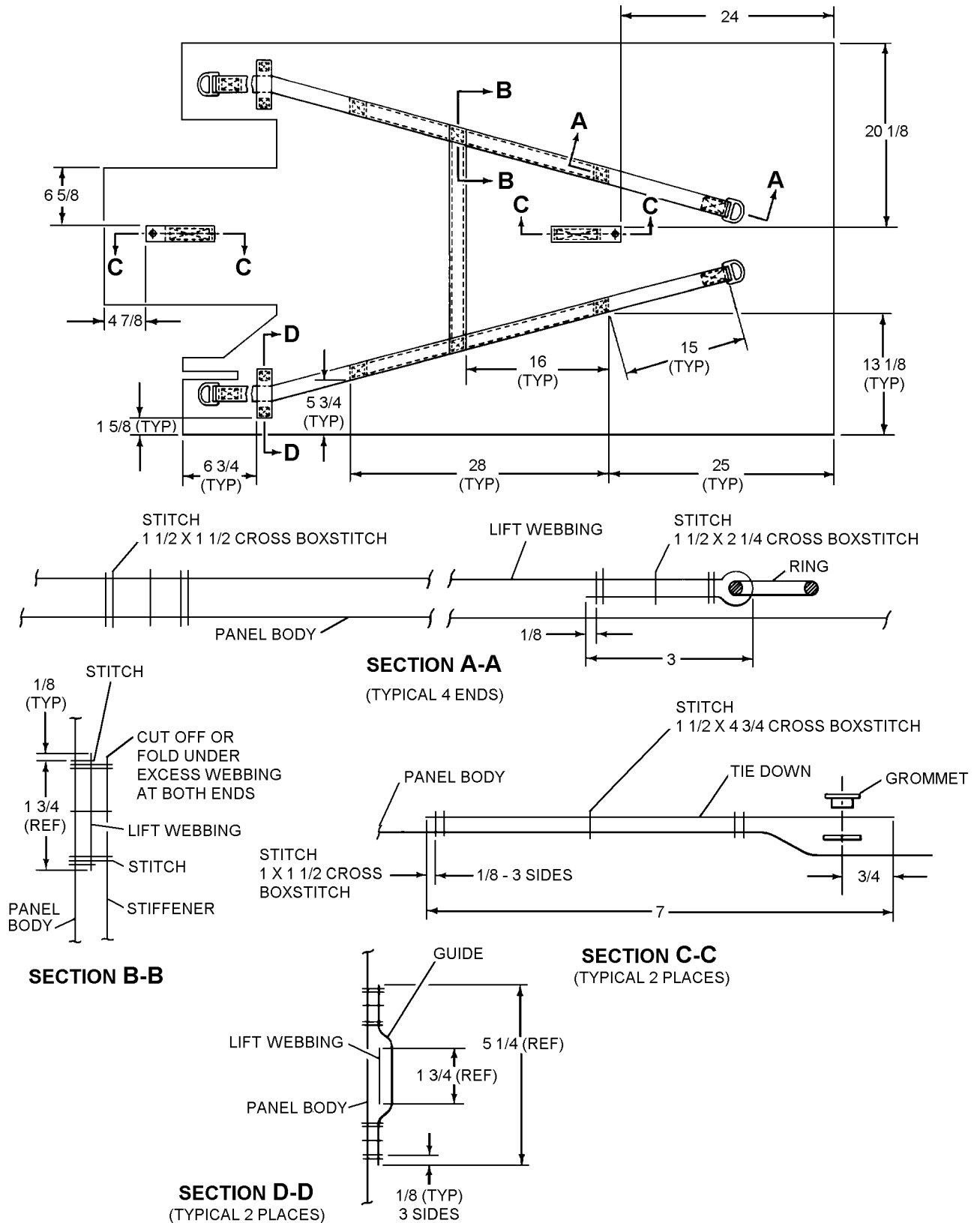


Figure 11-16. Webbing Locations

10110016

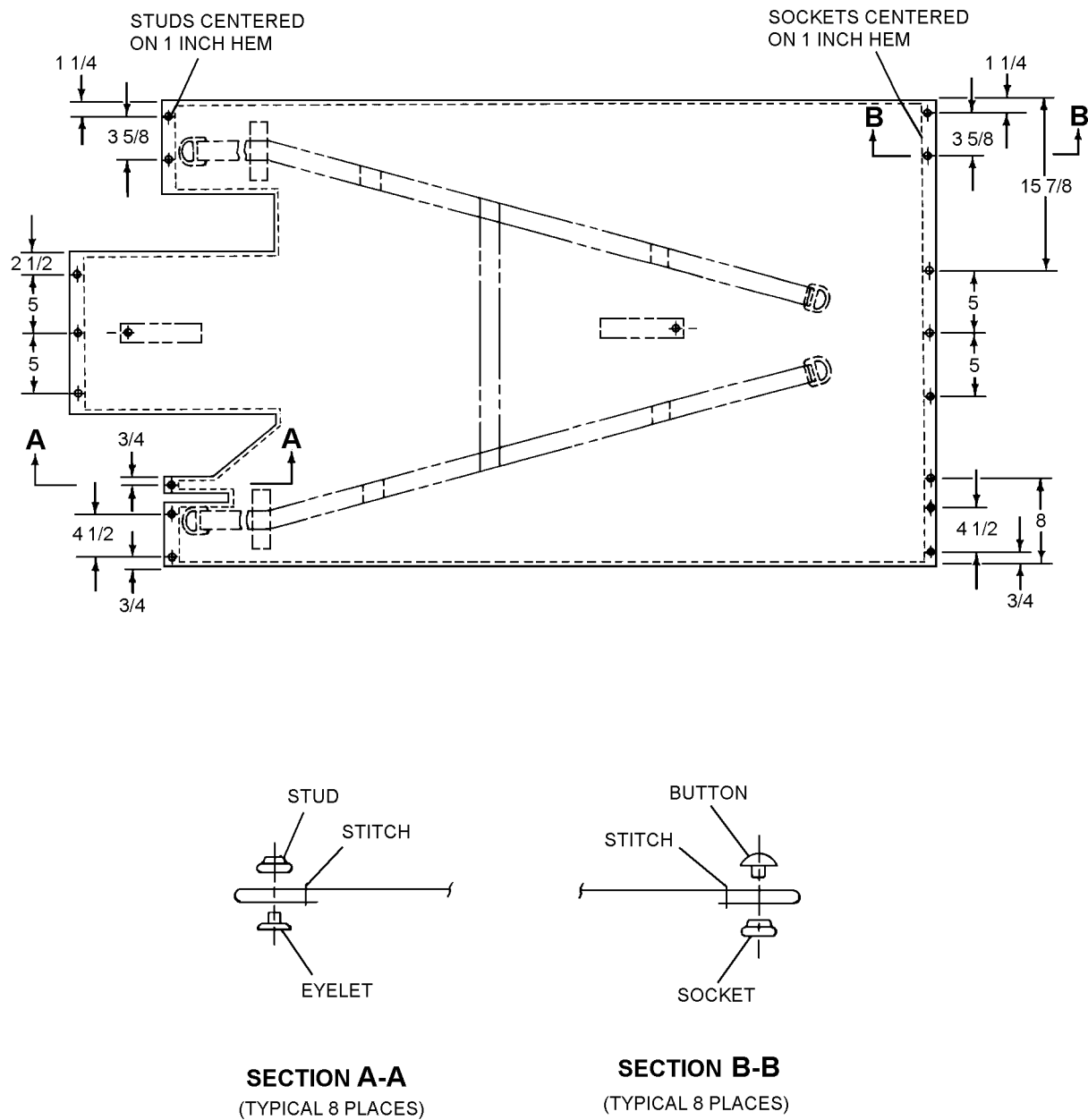


Figure 11-17. Fastener Locations

10110017

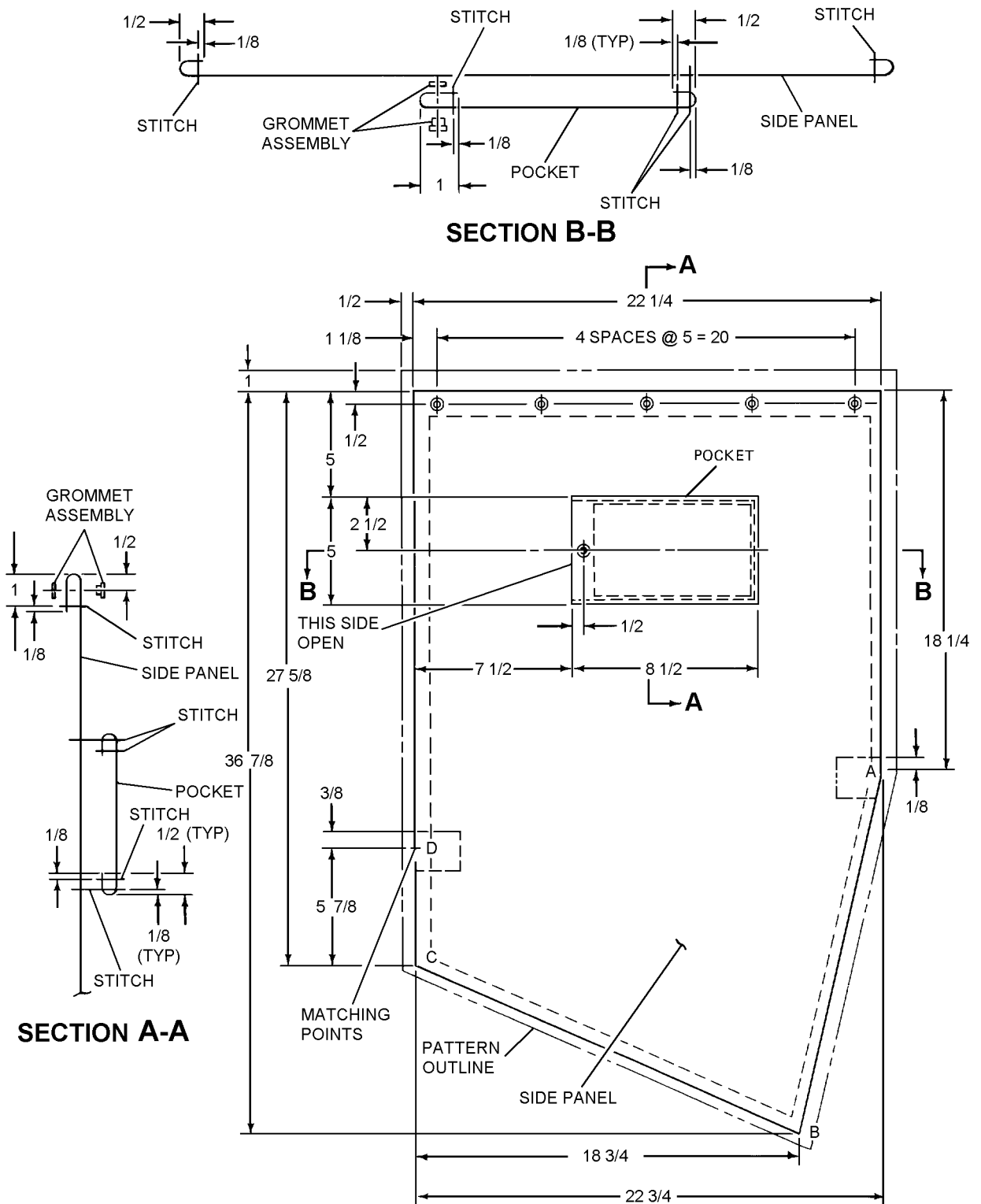


Figure 11-18. Side Panel

10110018

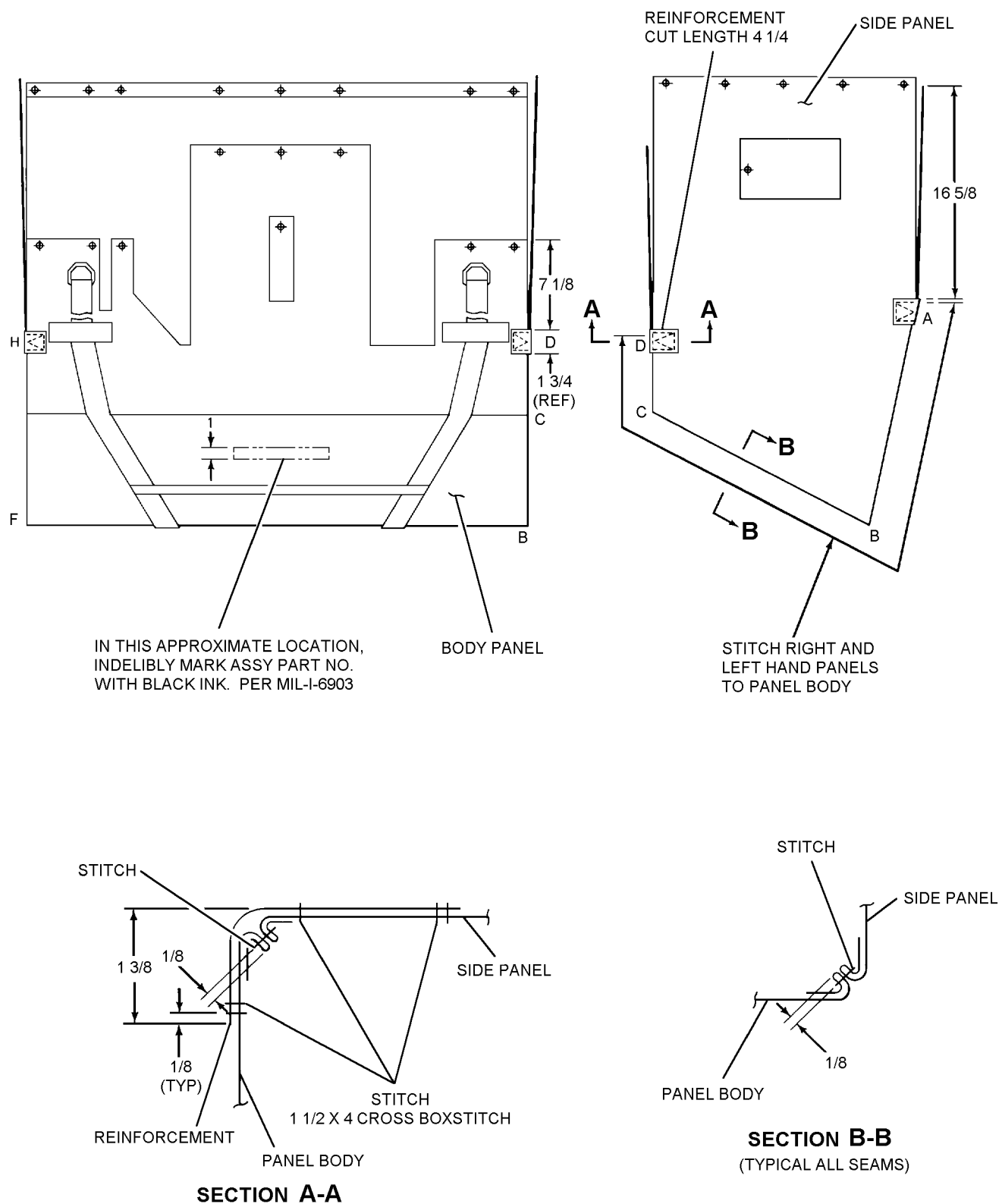


Figure 11-19. Assembled Container

10110019

6. Position the two 5 1/4-inch guide webbings onto body panel as shown and stitch in place as shown in Section D-D.

7. Attach 8 snap fasteners (MS27980) into the body panel as shown in [figure 11-17](#), centered on the 1-inch hems. Button/Sockets will be installed along the straight edge, buttons up and the Stud/Eyelets along opposite edge, studs up (Sections A-A and B-B).

8. From 23 3/4 inch x 38 3/8 inch pieces of coated cloth, fabricate both side panels. Allowing for 1/2 and 1-inch hems, cut material so that it will conform to inner line dimensions shown in [figure 11-18](#), after hems are made. Note the dimension from point A at the center of the right edge, to the left edge is 1/2 inch greater. Make 1/2-inch hems first, stitching 3/8 inch in along new edges. One-inch hem will then be made, stitched 7/8 inch in along new edge, overlapping 1/2-inch hems at corners. Locate and identify marker points on each side panel.

9. Install the 5 grommet assemblies (MS20230) on each side panel, centered on the 1-inch hem as shown in [figure 11-18](#).

10. Take, the 6-inch x 10-inch piece of coated cloth (pocket) and hem according to Sections A-A and B-B. Position a grommet assembly on the pocket opening and install as shown. Place the pocket assembly into position (1-inch hem facing 27 5/8-inch edge) on one side panel and stitch as shown in [figure 11-18](#). The opposite side panel is fabricated without pocket.

11. Place right and left hand side panels against body panel so that lettered marker points (A through H), shown on [figures 11-15](#), [11-18](#) and [11-19](#) coincide. Stitch side panels to body panel as shown in [figure 11-19](#), Sections A-A and B-B. Position four 4 1/4-inch lengths of webbing (reinforcements) at reinforcement points marked A, D, E, and H on figures, and stitch as shown.

11-68. FABRICATION OF MOCKUP C-130 AIRCRAFT WINGWELL. To fabricate a mockup C-130 aircraft wingwell to aid in packing LRU-15/A life-rafts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Locally Available Materials	—

NOTE

The following steps concern fabrication of a mock wingwell assembly for use during shop folding/packing of the liferaft. However, the liferaft may be accordion-folded into the new liferaft container directly in the aircraft wing should the mockup assembly not be desired.

1. Using available materials, construct a packing assembly as outlined in [figure 11-20](#). Using any suitable fastening devices, fasten liner flush with top of frame. Ensure that all edges are smooth and burrs are removed to prevent damage to liferaft. Use tape or equivalent nonabrasive material, wherever necessary, to smooth rough edges.

2. Fabricate a CO₂ cylinder cradle from available materials. (A spare CO₂ cylinder will be helpful in obtaining correct dimensions.) Allow provisions for left- and right-hand cylinder installations. Edges should be protected with tape or equivalent.

NOTE

Spare aircraft components (fiberglass liner and CO₂ cradle) may be used if available in place of locally fabricated parts.

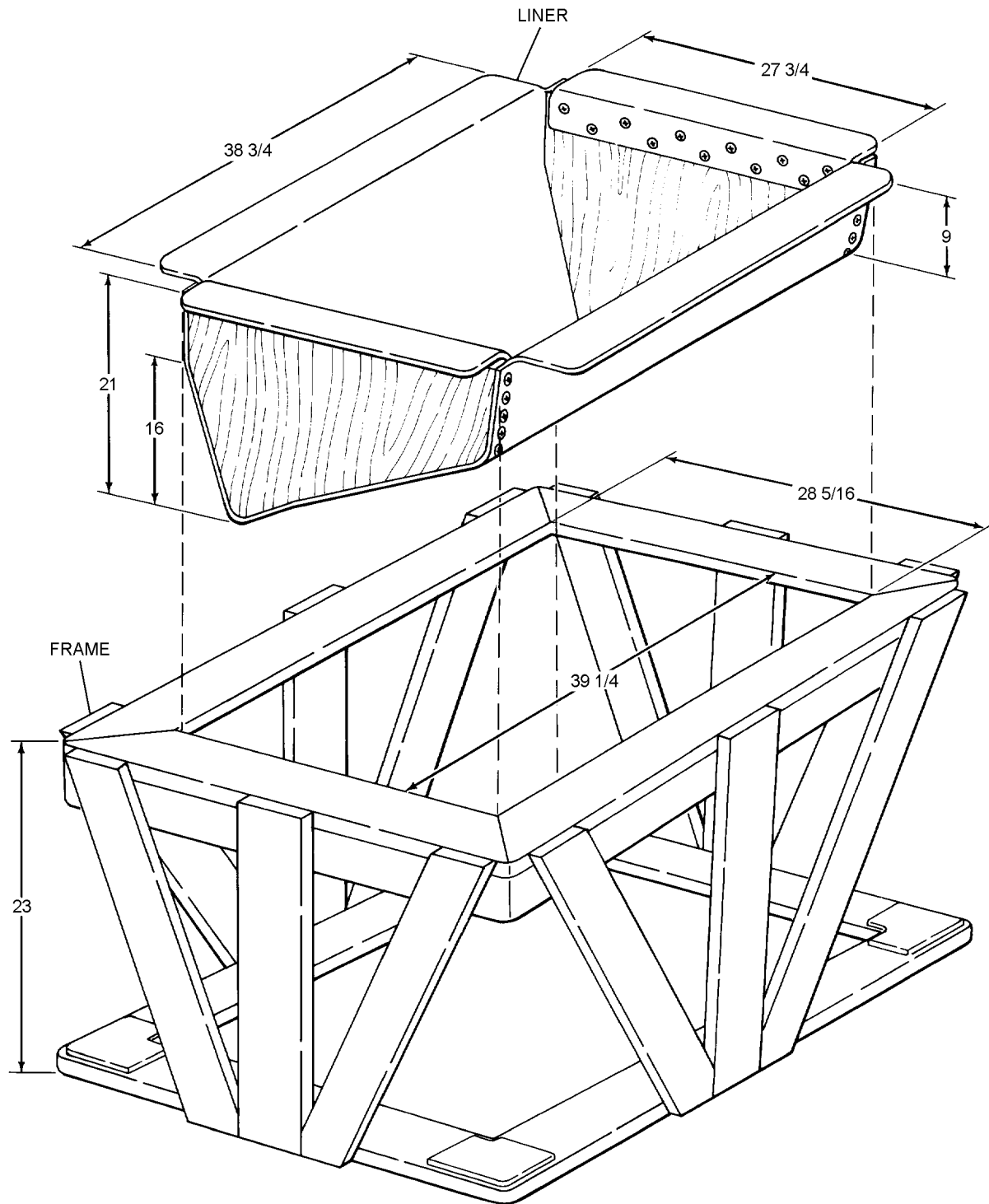
11-69. REMOVAL OF INLET VALVE CHECK ELEMENT AND FABRICATION OF IDENTIFICATION PATCH. To remove inlet valve check element, and to fabricate identification patch, proceed as follows:

Materials Required

Quantity	Description	Reference Number
4 x 7 inches	Cloth, Nylon, Rubber-Coated, Var. C	MIL-C-23070
As Required	Ink, Marking, Laundry, Black	TT-I-542 NIIN 00-161-4229

1. Deflate liferaft in accordance with [paragraph 11-25](#).

2. Disconnect manifold from liferaft.



MATERIAL: 1" X 4" PINE SHELIVING OR EQUAL

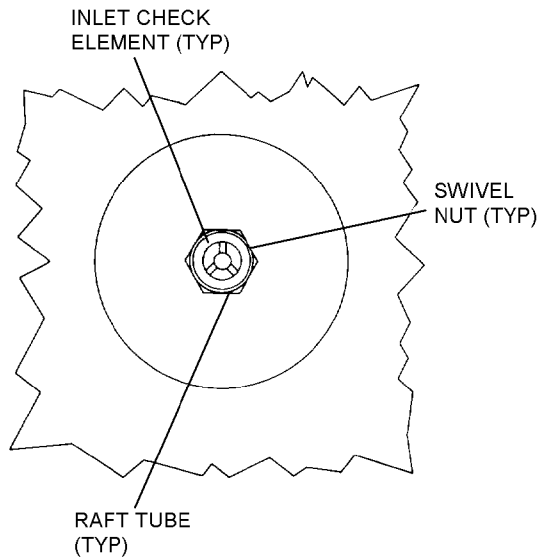
Figure 11-20. Packing Frame Assembly

10110020

NOTE

Ensure that inlet valve, swivel nut, and manifold are free of dirt and foreign matter.

3. Remove check element from inlet valve by forming a small hook from a paper clip; hook one of the trispoked legs and pull upwards, thus removing check element and spring.



K0069003

Step 3 - Para 11-69

WARNING

When reinstalling manifold (P/N 9153), ensure that nylon gaskets (P/N 1106AS108-2) are properly positioned; the two nylon gaskets with larger inside diameters are to be placed toward liferaft. When reinstalling manifold (P/N C-50980), ensure copper seals (P/N A50969) are present and properly positioned around the set screws on the outlets. Do not use nylon gaskets on the outlets with manifold P/N C-50980.

4. Reinstall manifold to liferaft. Torque to 140 to 150 in-lb.

5. Close vent. Partially inflate liferaft with air.

6. Open manifold and ensure that air escapes. Reclose vent. Vent shall remain closed until liferaft is installed in aircraft wing compartment.

7. Deflate liferaft in accordance with [paragraph 11-25](#).

8. Mark a 4 1/2 x 7 1/2-inch area directly above the manifold on upper tube.

NOTE

Any contrasting colored rubber-coated nylon cloth may be used to fabricate identification patch.

Ensure that identification markings on patch complies with basic liferaft configuration (LRU-15/A or MK-20 Liferaft).

9. Letter applicable markings on one side of patch. Use waterproof black ink. See [figure 11-21](#).

NOTE

Cement applications shall be performed in accordance with [paragraph 11-52](#).

10. Cement applicable identification patch to marked off area on upper tube.

11-70. REPLACEMENT OF MANIFOLD. To replace a defective manifold or to replace a P/N 716 manifold, with a P/N 9153 or P/N C-50980 manifold, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Manifold	9153 (CAGE 97375)
	-or-	
	Manifold	C50980 (CAGE 08407)
2	Seal, Copper	A50969 (CAGE 08407)
2	Gasket, Nylon	1106AS108-2 (CAGE 30003)
1	Gasket, Nylon	1106AS108-3 (CAGE 30003) NIIN 00-960-5735
	-or-	
1	Gasket Parts Kit, Manifold	1106AS108-1 (CAGE 30003) NIIN 00-960-5735

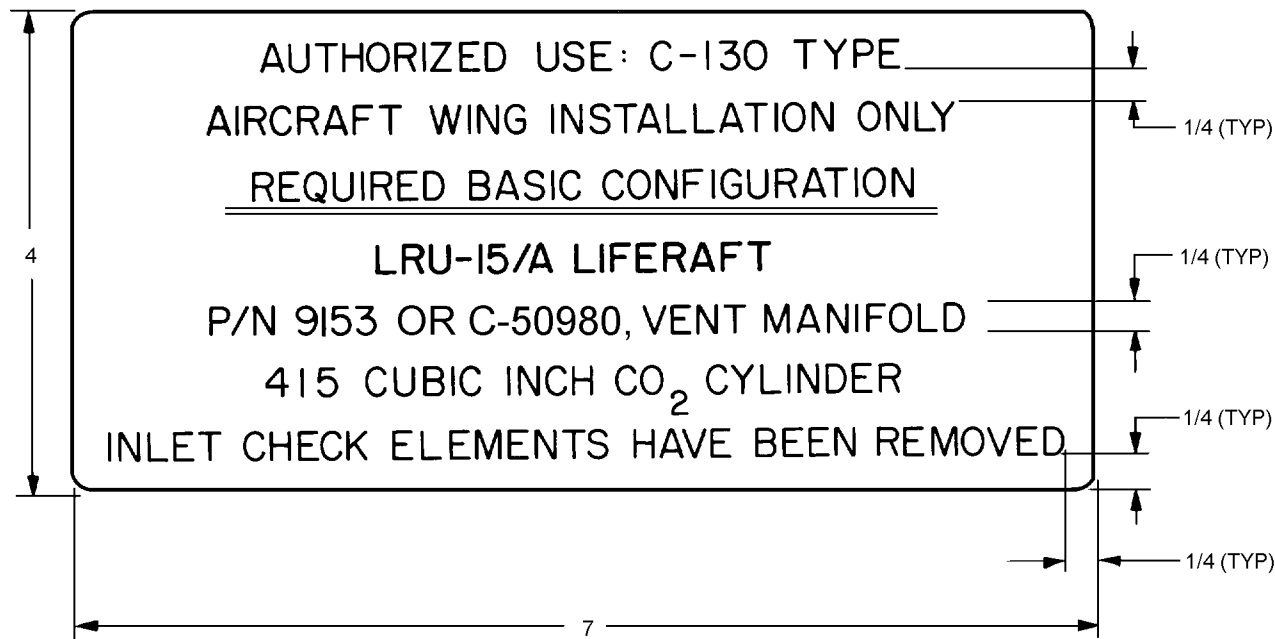


Figure 11-21. Identification Patch for C-130 Type Aircraft Wing Installation Liferaft

10110021

1. Perform functional test on new manifold P/N 9153 in accordance with [paragraph 11-24](#).
2. Remove defective manifold P/N 716, 9153 or C-50980 from inflation valve and liferaft.

WARNING

When reinstalling manifold (P/N 9153), ensure that nylon gaskets (P/N 1106AS108-2) are properly positioned; the two nylon gaskets with larger inside diameters are to be placed toward liferaft. When reinstalling manifold (P/N C-50980), ensure copper seals (P/N A50969) are present and properly positioned around the set screws on the outlets. Do not use nylon gaskets on the outlets with manifold P/N C-50980.

3. Install new manifold onto inflation valve and liferaft. Torque to 140 to 150 in-lb.
4. Ensure that gaskets and seals are installed. Nylon gaskets P/N 1106AS108-2 are used on manifold 9153 at the raft connection points. Copper seals A50969 are used on manifold C-50980 at the raft connection points. Nylon gasket P/N 1106AS108-3 is used on both the 9153

and C-50980 manifolds at the inflation valve connection point.

NOTE

To reset manifold P/N C-50980 to vent position, apply inward pressure on the head of the Breather Piston, in the center of the stainless steel nut until reseated in the detent.

5. Push manifold vent/shut poppet in; ensure that vent/shut poppet is down in VENT position.

11-71. FABRICATION OF SURVIVOR ATTACHMENT STRAP (LRU-15/A DROPPABLE LIFE-RAFT). To fabricate survivor attachment strap, proceed as follows:

Materials Required

Quantity	Description	Reference Number
14 inches	Webbing, Nylon Type II, 1 inch, Neutral	MIL-W-4088
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884
1	Snaphook	M43770/1-CWBC3

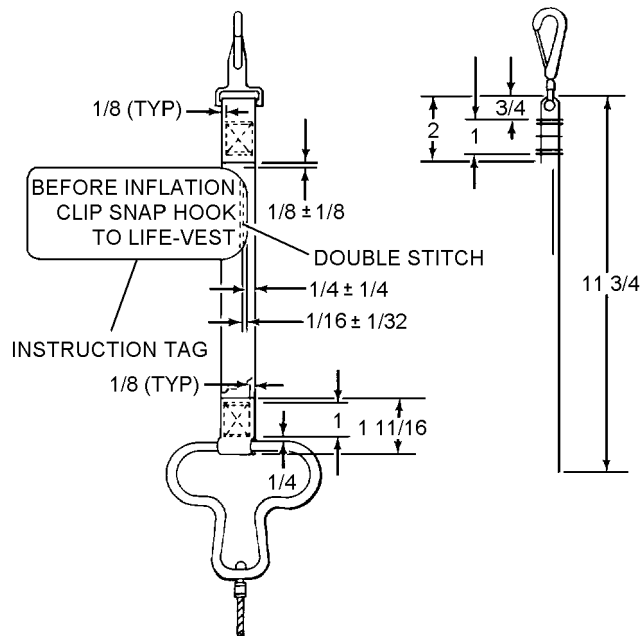


Figure 11-22. Survivor Attachment Strap

10110022

1. Using dimensions shown in figure 11-22, pass one end of nylon webbing through snaphook, fold over 2 inches; then sew a 2-inch crossboxstitch with size E nylon thread.

2. Using dimensions shown in figure 11-22, fold opposite end of nylon webbing around ripcord handle approximately 1 11/16 inches; then cross boxstitches with size E nylon thread.

3. Position instruction tag below crossboxstitch on snaphook end. Double stitch instruction tag to webbing with size E nylon thread. See figure 11-22.

11-72. REPLACEMENT OF LIFERAFT HEAVING LINE. To replace liferaft heaving line proceed as follows:

Materials Required

Quantity	Description	Reference Number
75 feet	Cord, Nylon, Coreless Type I, 400 lb Test	MIL-C-7515

1. If required, untie bowline knot and remove defective heaving line from attachment loop in heaving line pocket on main tube of liferaft.

2. Using bowline knot secure one end of replacement line to attachment loop in heaving line pocket.

3. Secure heaving line grommet to opposite end of heaving line using bowline knot.

4. Fake heaving line on flat surface using into 13-inch bights. Gather the line and place rubberband around each end one to two inches from end of bights.

5. Place heaving line in heaving line pocket under grommet. Close pocket and secure snaps.

11-72A. REPAIR OF LIFERAFT CARRYING CASE. To repair the liferaft carrying case, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Thread, Nylon Size E, Type I or II	V-T-295
As Required	Cloth, Laminated, Var. C, Orange	MIL-C-23070 NIIN 00-081-5829

1. Tears of less than 1 inch shall be darned or repaired with a zigzag stitch.

2. Tears of 1 to 6 inches shall be covered with a patch.

3. Broken stitching shall be repaired by over-stitching 2 inches past the ends of the broken stitches and shall be back-stitched 1 inch.

4. Tears of over six inches shall not be repaired.

11-73. PACKING LRU-15/A LIFERAFT.

11-74. The LRU-15/A liferaft assembly may be packed for droppable or for wing installation. The method used depends upon the aircraft application. The LRU-15/A shall be packed by qualified personnel at the lowest level of maintenance possible. Cleaning and servicing instructions may be found in paragraph 11-39.

11-75. PACKING PROCEDURE FOR LRU-15/A LIFERAFT ASSEMBLY (DROPPABLE). To pack a droppable LRU-15/A liferaft assembly, proceed as follows:

1. Ensure that liferaft, carrying case, and accessory container have been inspected in accordance with paragraph 11-13. Liferaft packing components are listed in table 11-11.

2. Ensure that survival items have been inspected for expiration and damage. Refer to table 11-7 for items used.

Table 11-11. Liferaft Packing Components (Droppable)

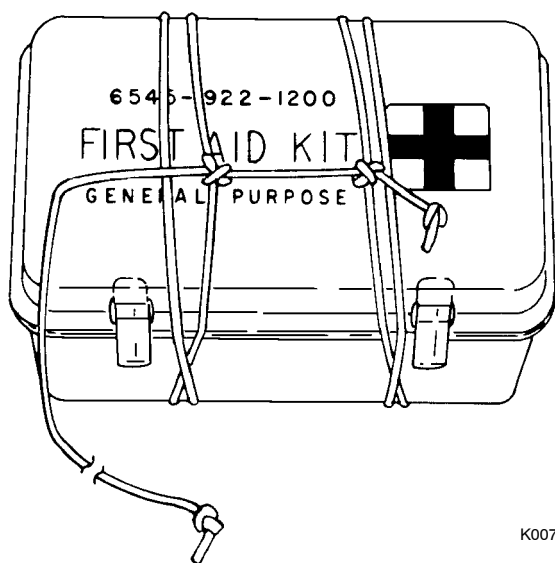
Component	Quantity	Reference Number	NIIN	SM&R Code
Carrying Case	1	63A80H6-1 (CAGE 30003)	00-913-1065	PAOGG
Accessory Container	1	63A80H4-1 (CAGE 30003)	00-842-7112	PAOZZ
Survivor Attaching Line	1	63A80H6-13 (CAGE 30003)	—	XAGZG
Inflation Assembly Cover	1	63A80H8-1 (CAGE 30003)	—	PAOZZ

NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modification to the survival items.

3. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap (NIIN 00-142-9008) and secure with rubber bands. Stow survival items in accessory container and supply pocket. Tie hand pump, installed radio(s), and Manual Reverse Osmosis Desalinator (MROD) to accessory container handle with a 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

4. Secure latches on first aid kit several layers of pressure-sensitive tape (NIIN 00-266-5016). Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container grommet and secure with a bowline knot. Stow first aid kit in accessory container.



K0075004

Step 4 - Para 11-75

5. Ensure that all topping-off valves are closed.

NOTE

Procure 26-foot length of nylon cord, Type III (MIL-C-5040) from supply. Ensure that both ends of cord have been seared to prevent fraying.

6. Attach nylon cord to ripcord cable loop with a square knot, leaving a 5-foot length of nylon cord on one side for the actuation line and a 20-foot length of nylon cord on the opposite side for a retaining line. Safety-tie square knot with one turn of size E thread. See figure 11-23.

7. Using a bowline knot, secure 5-foot nylon cord actuation line to inflation assembly snaphook. Safety-tie bowline knot with one turn of size E thread. See figure 11-23.

WARNING

Wrap only the snaphook. Tape which extends to the pull cable housing will impede proper actuation of the liferaft assembly.

8. Wrap pull cable snaphook with a layer of wide paper tape to prevent snaphook from hanging up on case after connection.

9. Using a bowline knot, secure 20-foot nylon cord retaining line to neck of CO₂ cylinder. Safety-tie bowline knot with one turn of size E thread. See figure 11-23.

10. Ensure that cylinder valve antichafing sleeve is installed. Ensure that proper inflation assembly cover is used to cover inflation assembly.

11. Fake 20-foot nylon cord retaining line and sea anchor mooring line and secure with rubber bands.

12. Stow sea anchor and faked sea anchor mooring line in sea anchor pocket.

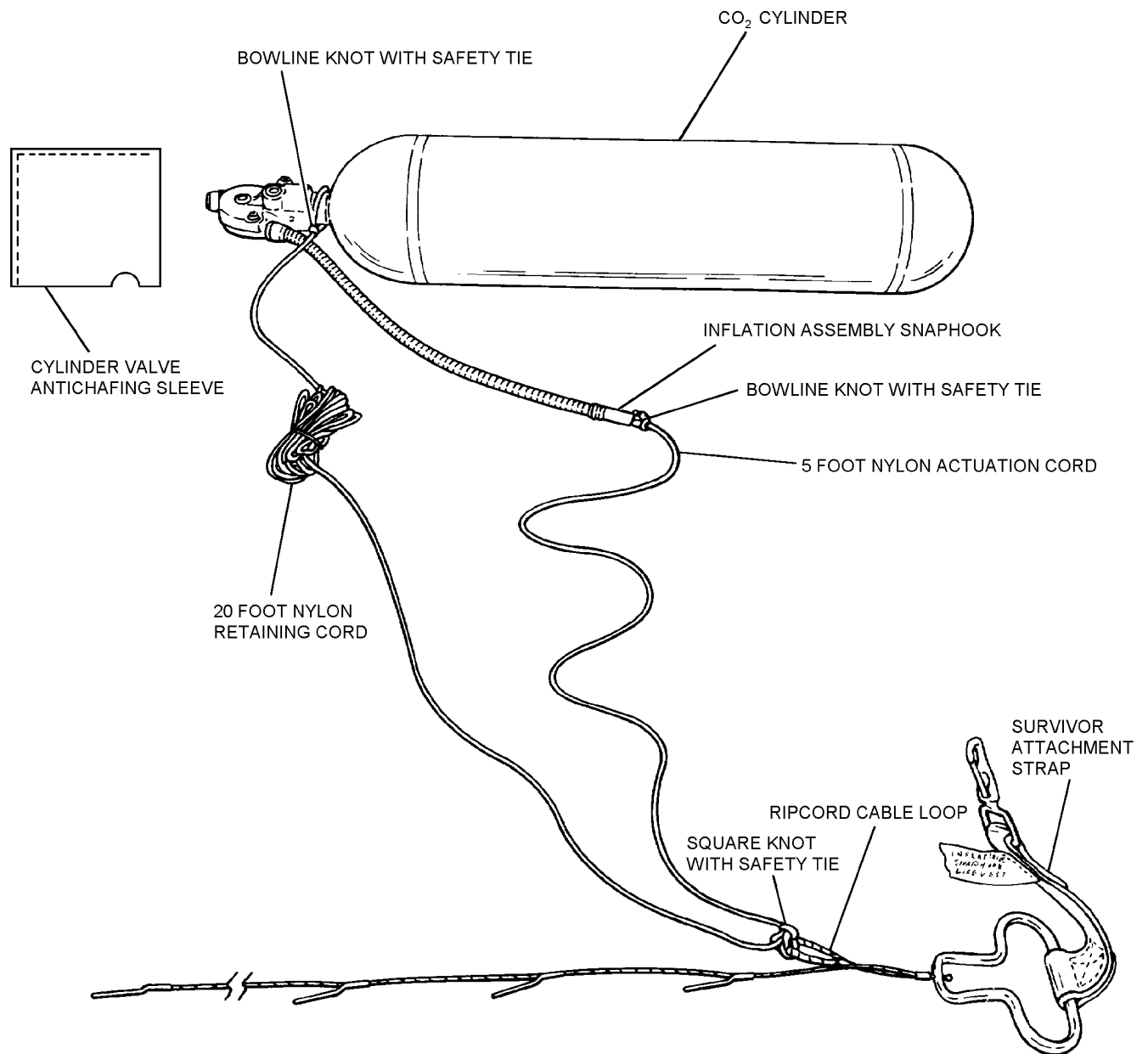


Figure 11-23. CO₂ Cylinder Down-Pull Routing

10110023

NAVAIR 13-1-6.1-1

13. Stow heaving lines in heaving line pockets as follows:

a. Secure the loose end of the heaving line to the loop in the bottom of the heaving line pocket with a bowline knot.

b. Remove all twists and tangles from heaving line and grommet.

c. Fake the heaving line in 11 to 13-inch bights on a flat surface starting 12 to 15 inches from the loop in the bottom of the heaving line pocket.

d. Continue faking until 15 to 21 inches of line remains, measured from last bight of line to the grommet.

f. Place the heaving line under the grommet in the heaving line pocket and close the pocket.

14. Dust entire liferaft assembly lightly with talc (MIL-T-50036A).

15. Stow painter line in painter line pouch by forming eight 3 1/2-inch bights in line and inserting each bight in eight hesitator loops provided. Leave 30 inches of unstowed painter line at each end of pouch. See [figure 11-24](#). Close pouch; then secure with hook and pile tape provided.

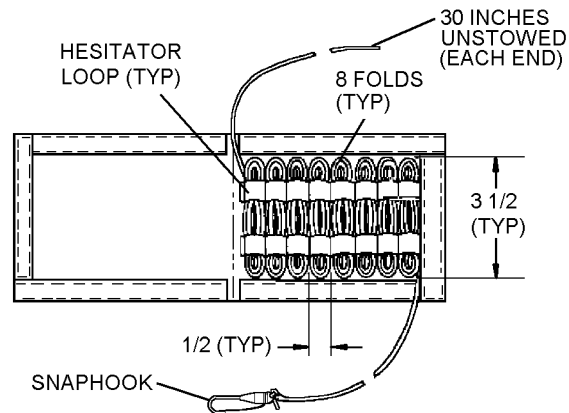
16. Attach snaphook to end of unstowed painter line extending from open end of pouch with a bowline knot.

17. Attach end of painter line without snaphook to survivor holding handle on tube section 7.

WARNING

To prevent possible malfunction during inflation ensure that no lifeline, sea anchor mooring line, painter line, or retaining line entangles or loops liferaft hardware during folding and packing procedure.

18. Fold raft in accordance with [figure 11-25](#). Position accessory container on folded raft and tie to nearest survivor holding handle using a 10-foot length of Type III nylon cord (MIL-C-5040).



10110024

Figure 11-24. Stowed Painter Line

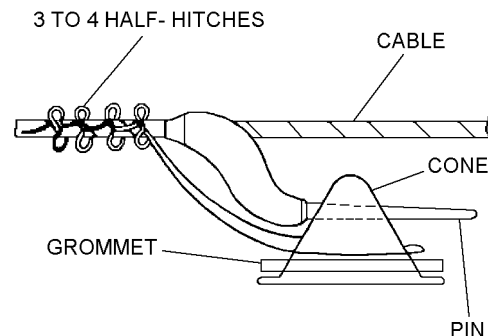
19. Insert rolled liferaft into carrying case so that pull cable housing and attached actuation line are positioned toward carrying case ripcord handle end flap.

20. Stow painter line pouch behind carrying case end flap opposite from ripcord handle end of container; then attach painter line snaphook to end flap carrying handle.

NOTE

Painter line snaphook shall be attached temporarily to the end flap carrying handle opposite from ripcord end of container. This will provide for easy access to the painter line snaphook for attachment to aircraft.

21. To close carrying case, place grommet over locking cones and insert ripcord pins into locking cones. Safety-tie first, middle, and last ripcord pins by passing a 11-inch length of size E nylon thread (V-T-295) under ripcord pin. Secure thread to ripcord cable with 3 or 4 half-inches.



K0075021

Step 21 - Para 11-75

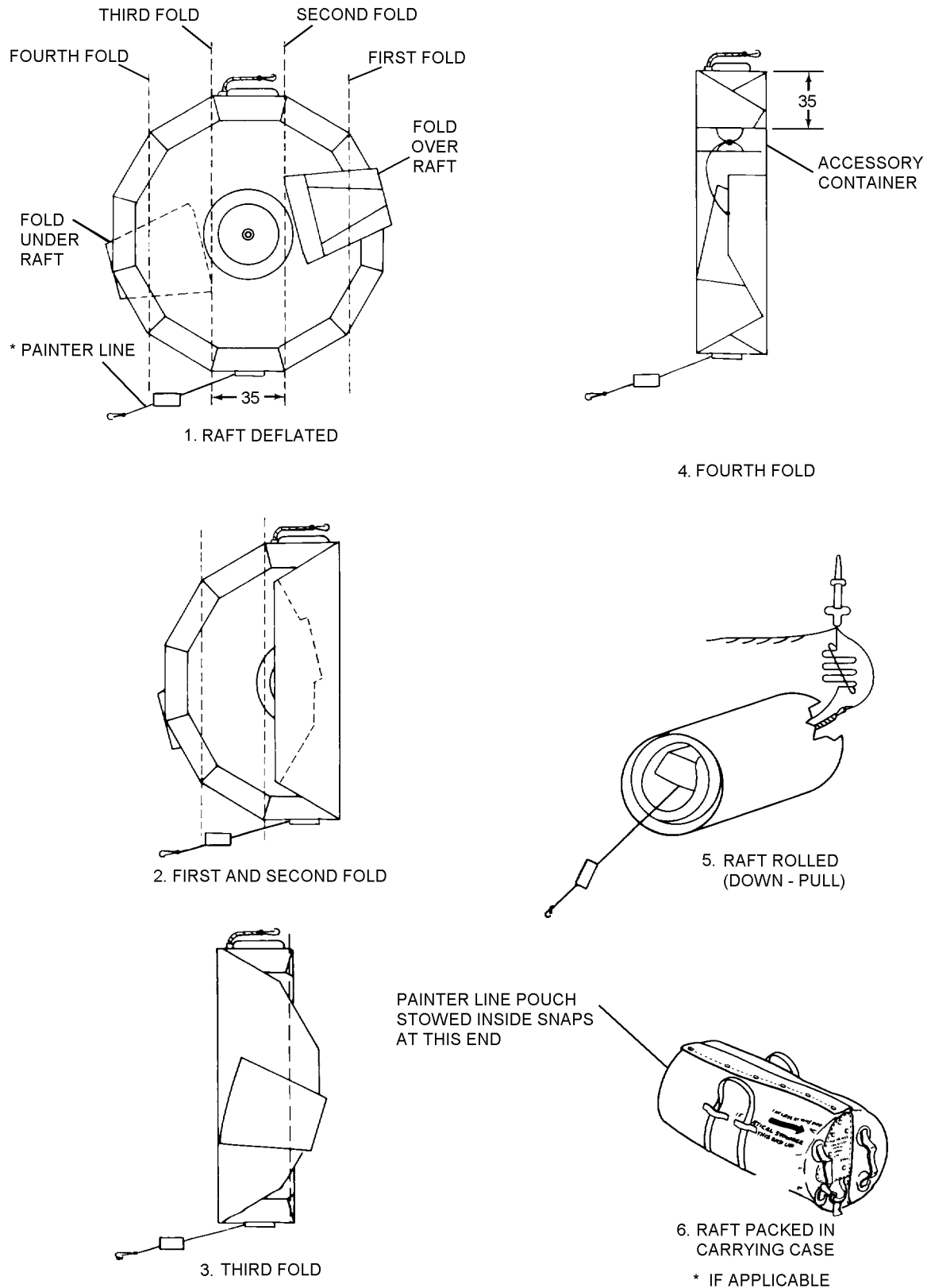
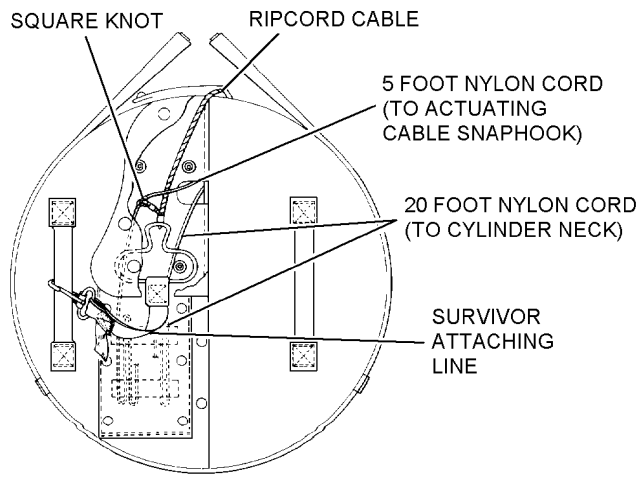


Figure 11-25. LRU-15/A Folding Procedure (Droppable)

10110025

22. Complete closure of carrying case by securing snap fasteners of cable protector flap closed. Position ripcord handle under protective flap on carrying case end flap. Attach survivor attachment line snaphook to end flap carrying handle. Stow 20-foot nylon cord retaining line and 5-foot nylon cord actuating line secure remaining snap fasteners.



Step 22 - Para 11-75

K0075022



To prevent pull cable housing breakage, do not stow or store liferaft pack on ripcord handle end of pack.

23. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

11-76. PACKING PROCEDURE FOR LRU-15/A LIFERAFT (C-130 WING INSTALLATION). To pack an LRU-15/A liferaft assembly for C-130 wing installation, proceed as follows:

1. Ensure that liferaft, container, and accessory container have been inspected in accordance with paragraph 11-13. Liferaft packing components are listed in table 11-12.

NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modification to the survival items.

2. Ensure that survival items have been inspected for expiration and damage. Refer to table 11-7 for items used.



Cushioning wrap shall not be used for wrapping survival items in C-130 external-ly stowed liferafts.

3. Wrap breakable survival items with rubber-coated cloth, and secure with rubber bands. Stow survival items in accessory container. Tie hand pump, PRT-5 transmitter, and Manual Reverse Osmosis Desalinator (MROD) to accessory container grommet with a 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

Table 11-12. Liferaft Packing Components (C-130 Wing)

Component	Quantity	Reference Number	NIIN	SM&R Code
Carrying Case	1	CL214D2-1 (R/H) (CAGE 80206) or CL214D2-2 (L/H) (CAGE 80206)	00-138-7121 00-138-7119	PAOGG
Accessory Container	1	63A80H11-1 (CAGE 30003)	00-075-8328	PAOZZ
Inflation Assembly Cover	1	63A80H8-1 (CAGE 30003)	01-126-6141	PAOZZ

4. Secure latches on first aid kit several layers of pressure-sensitive tape (NIIN 00-266-5016). Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container grommet and secure with a bowline knot. Stow first aid kit in accessory container.

5. Attach locally fabricated vent valve streamer (figure 11-26) to vent manifold assembly. Streamer shall remain attached to vent until liferaft compartment door is ready for closing.

6. Ensure that all topping-off valves are closed.

7. Ensure that cylinder valve antichafing sleeve is installed. Ensure that proper inflation assembly cover is used (see figure 11-3).

8. Fake sea anchor mooring line and secure with a rubber band. Stow sea anchor and faked sea anchor mooring line in sea anchor pocket.

9. Stow heaving lines in heaving line pockets (paragraph 11-75).

10. Dust entire raft assembly lightly with talc (MIL-T-50036A).

NOTE

Painter lines shall be installed in all multi-place liferafts. The painter line shall be a 60-foot length of Type I, Nylon Cord (MIL-C-5040, NIIN 00-240-2154). The painter line retains a deployed raft to the aircraft during emergency egress and is designed to break under a 100 pound pull if the aircraft sinks.

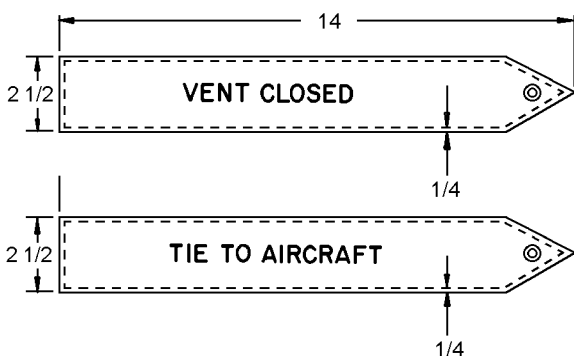


Figure 11-26. Streamers

10110026

11. Stow painter line in painter line pouch by forming eight 3 1/2-inch bights in line and inserting each bight in one of the eight hesitator loops provided. Leave 24 inches of unstowed painter line at each end of the pouch. (See figure 11-27.) Close pouch; then secure with hook and pile tape provided.

12. Attach snaphook to end of unstowed painter line extending from open end of pouch with a bowline knot.

13. Attach end of painter line without snaphook to the survivor-holding handle on tube section 7.

WARNING

To prevent possible malfunction during inflation ensure that no lifeline, sea anchor mooring line, painter line, or retaining line entangles or loops liferaft hardware during folding and packing procedures.

14. Fold raft in accordance with figure 11-28. Ensure that edges of folded raft are 5 inches from each end of CO₂ cylinder and inflation valve.

NOTE

The following sequence shall be followed for left wing installation. Reverse raft for right wing installation.

15. Attach locally fabricated red streamer (Tie To Aircraft, figure 11-26) to end of painter line. Streamer shall remain attached until line is attached to aircraft.

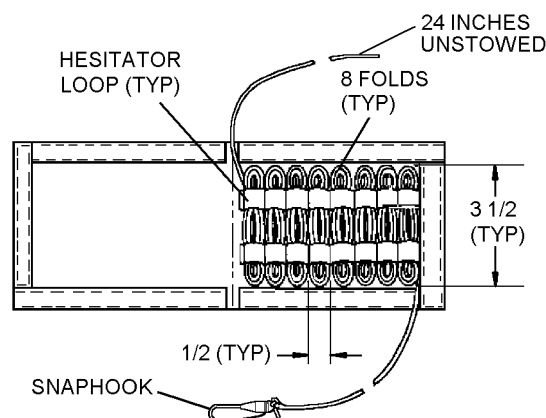


Figure 11-27. Stowed Painter Line

10110027

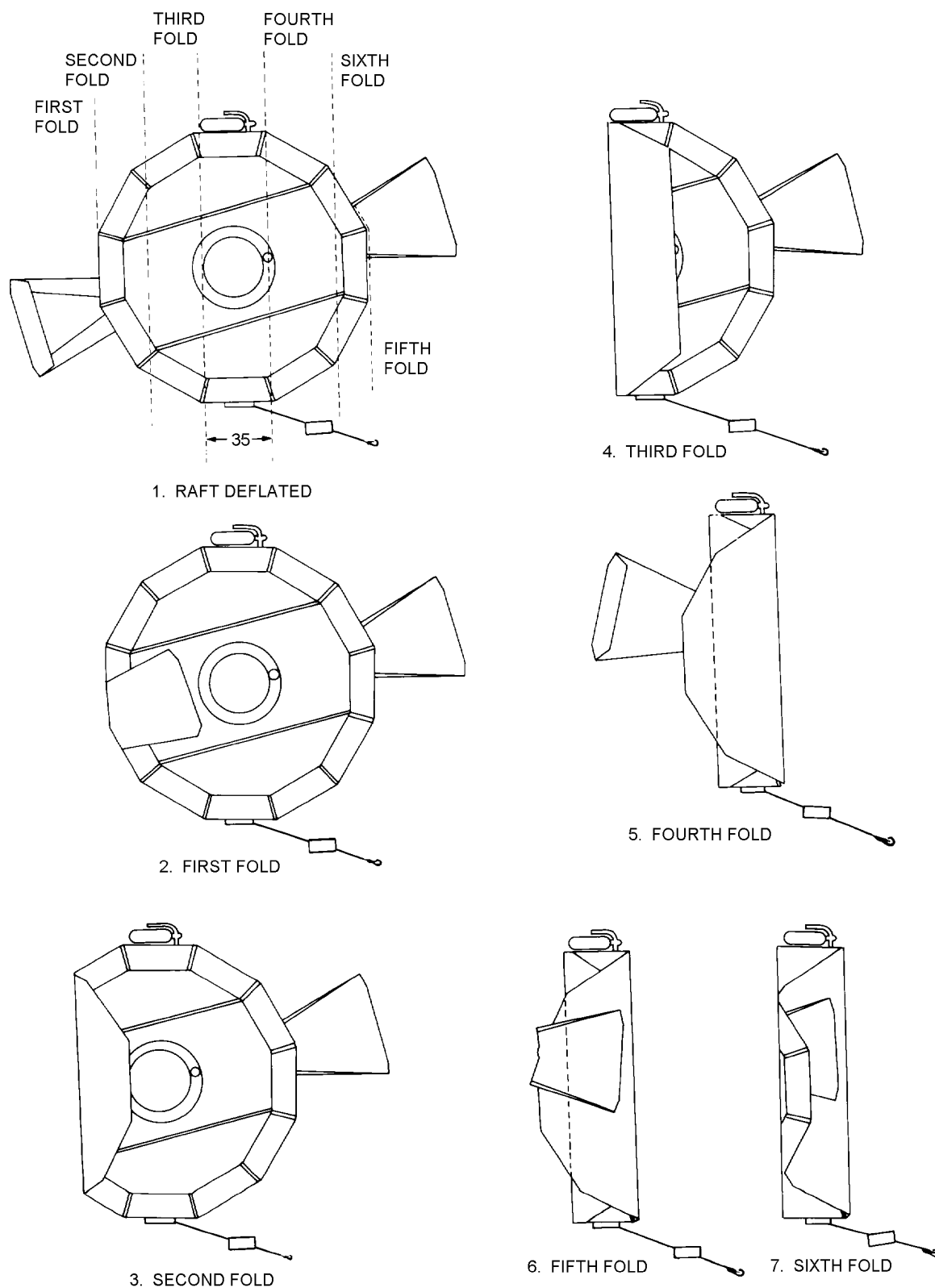
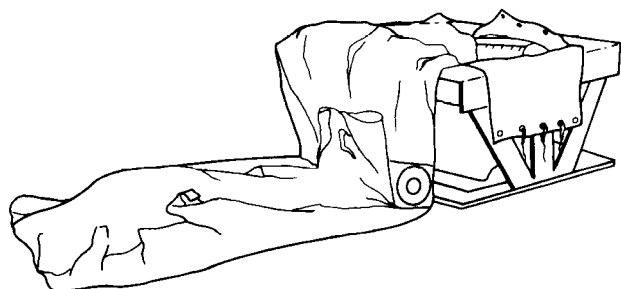


Figure 11-28. LRU-15/A Folding Procedure (C-130 Wing Installation)

10110028

16. Pull raft over edge of packing assembly opposite cylinder cradle and place cylinder in cradle.



K0076016

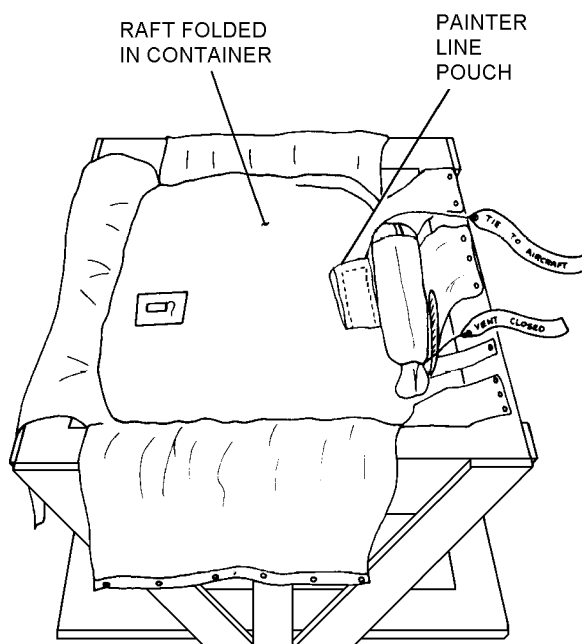
Step 16 - Para 11-76

17. Holding cylinder in cradle, smooth raft at bottom of container.

18. Accordion fold remainder of raft into container, smoothing each fold to make raft as compact as possible. Last fold shall be flush with cylinder.

19. Place accessory container on liferaft. Using 10 foot length of Type III nylon cord, tie one free end to both handles of container using bowline knot. Tie other end of cord to Survivor Holding Handle subassembly opposite CO₂ cylinder using bowline knot.

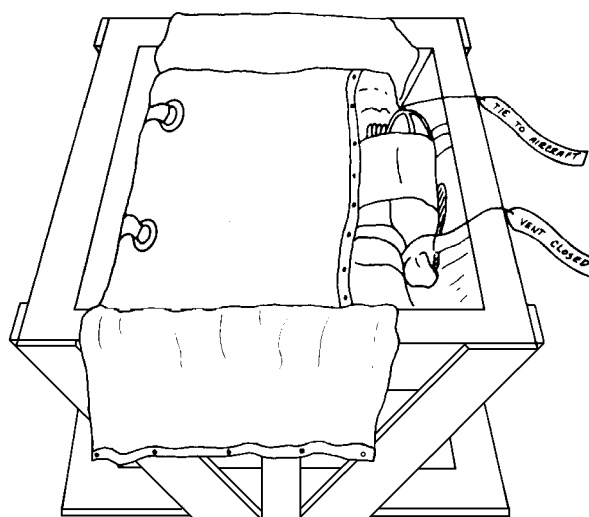
20. Place pointer line pouch along cylinder as shown. Allow end with streamer to project through container opening.



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Step 20 - Para 11-76

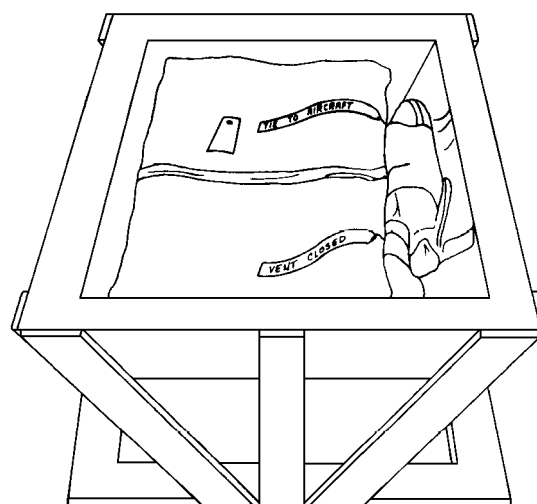
21. Fold front and back flaps over a raft container and cylinder. Fasten snaps.



K0076021

Step 21 - Para 11-76

22. Fold the two side flaps over and lace together using nylon size F thread (V-T-295) single, or 16-pound (breaking strength) cotton cord. Tie ends to tie down tabs on front and rear of container. Position vent and tie-to-aircraft warning streamers as shown.



K0076022

Step 22 - Para 11-76



Red warning streamers shall remain attached until vent valve is opened and painter line is attached during aircraft installation.

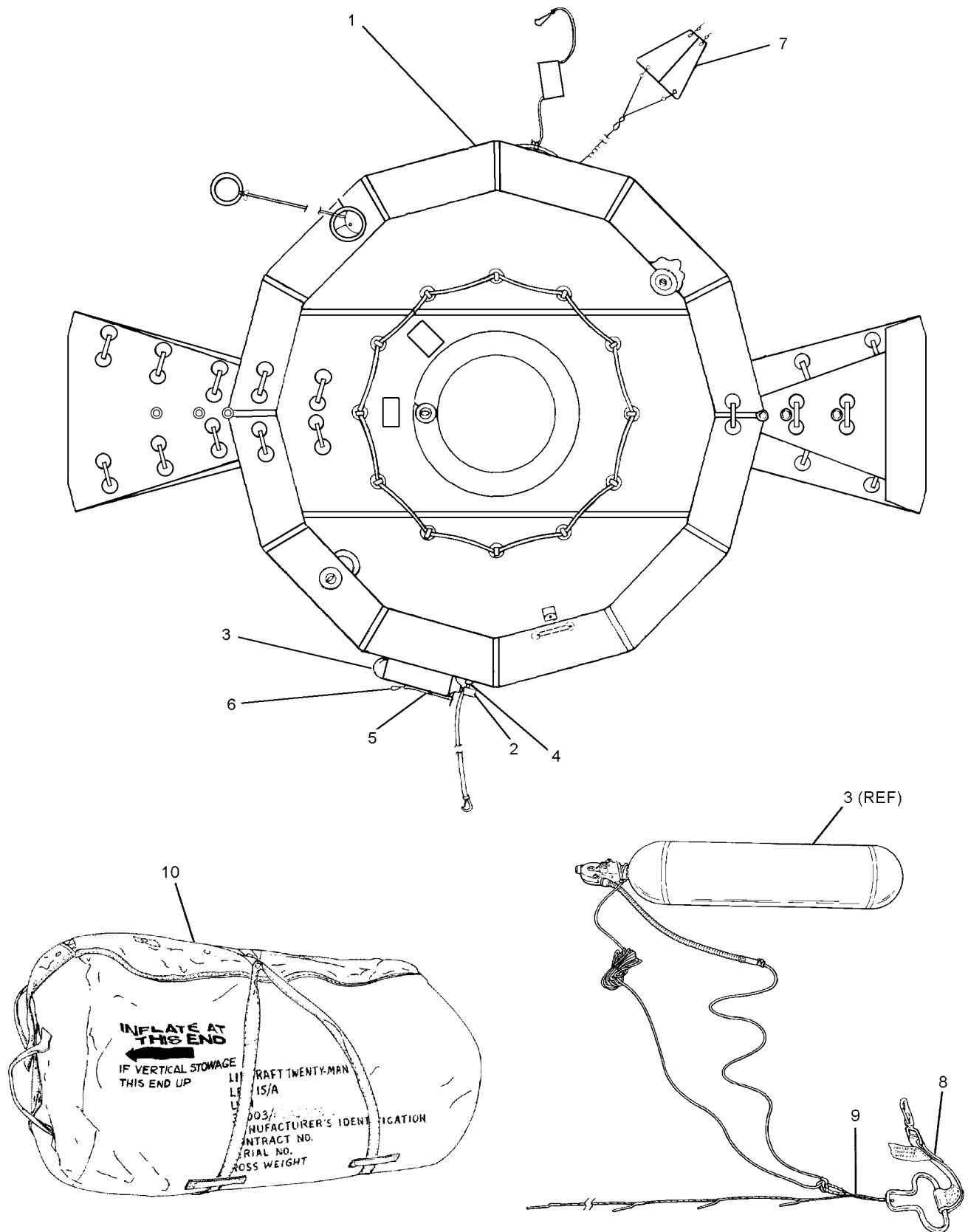
23. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

Section 11-4. Illustrated Parts Breakdown (IPB)

11-77. GENERAL.

11-78. This section lists and illustrates the assemblies and detail parts of the LRU-15/A Inflatable Twenty-Man Liferaft.

11-79. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.



10110029

Figure 11-29. LRU-15/A Liferaft (Droppable) Illustrated Parts Breakdown

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
11-29		LRU-15/A LIFERAFT ASSEMBLY (Note 5)	REF	
-1	63A80H1-601	. LIFERAFT, Twenty-Man Inflatable (CAGE 30003) (NIIN 01-011-7478) (LRU-15/A) (Note 1)	1	
-2	63A120H1-71	. . INFLATION VALVE (CAGE 30003) (Note 2) (Note 3)	1	
-3	MS26545B2C0415	. . . CO ₂ CYLINDER (CAGE 96906) (NIIN 00-595-3698) (Note 3)	1	
-4	9153	. . . MANIFOLD (CAGE 97375) (NIIN 00-075-9389)	1	
	C50890	. . . MANIFOLD (CAGE 08407)	1	
-5	1106AS102-1	. . . HOUSING ASSEMBLY (CAGE 30003) (NIIN 00-141-0721)	1	
-6	1106AS104-1	. . . CABLE ASSEMBLY (CAGE 30003) (NIIN 00-107-1656)	1	
-7	MIL-A-3339	. . SEA ANCHOR, Type I, Size 3 (NIIN 00-850-6552) (Note 4)	1	
-8	63A80H6-13	. SURVIVOR ATTACHMENT STRAP (CAGE 30003) (Note 6)	1	
-9	—	. RIPCORDER (Supplied by Vendor)	1	
-10	63A80H-1	. CARRYING CASE (CAGE 30003) (NIIN 00-913-1065)	1	
Notes: 1. Inflatable twenty-man liferaft P/N 63A80H1-601 is the bare liferaft without the inflation system and survival items. 2. Item is no longer procured or stocked. Item may be obtained through salvage. 3. The CO ₂ cylinder and inflation valve P/N 63A120H1-71 when assembled as a unit becomes (CAGE 30003) P/N 63A120H1-16, which can be requisitioned as a complete assembly. 4. Due to low demand, sea anchors may not be stocked. They may be open purchased from the Patten Co, 1803 Madrid Ave, Lake Worth, FL (561) 588-8500. 5. The LRU-15/A 20 person life raft is being replaced by the new 20 person MPLR LRU-32/A, P/N 64510-101, on an attrition basis, for all aircraft applications except the C-130. C-130 units must continue to use the LRU-15/A due to the unique wing installation. All other aircraft operators must order the new MPLR. See Chapter 12 for MPLR information. 6. Locally fabricated in accordance with figure 11-22.				

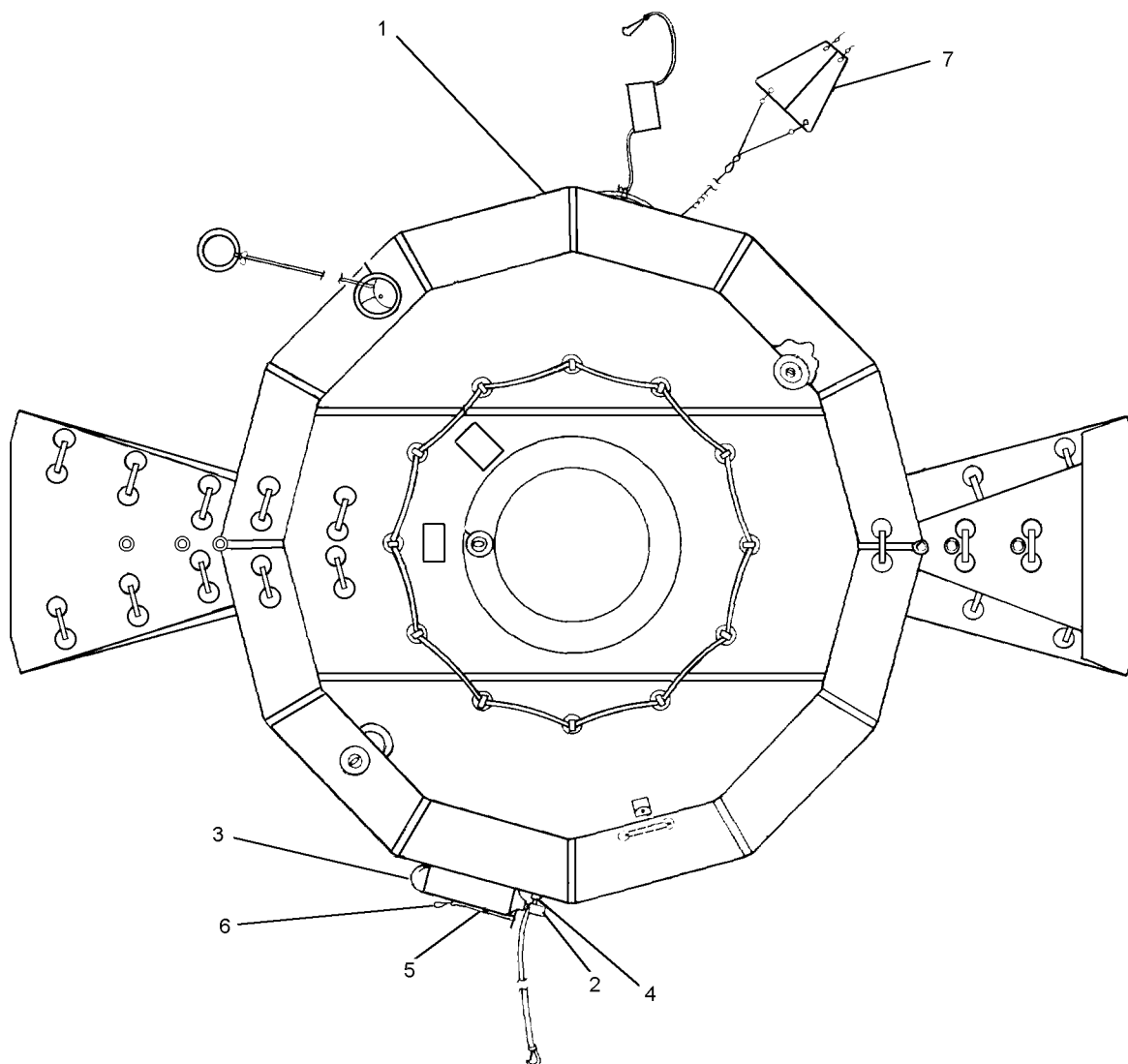


Figure 11-30. LRU-15/A Liferaft (C-130 Wing Installation) Illustrated Parts Breakdown

10120030

NAVAIR 13-1-6.1-1

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
11-30		LRU-15/A LIFERAFT ASSEMBLY (Note 6)	REF	
-1	63A80H1-601	. LIFERAFT, Twenty-Man, Inflatable (LRU-15/A) (CAGE 30003) (NIIN 01-011-7478) (Note 1) (Note 4)	1	
-2	63A120H1-71	. . INFLATION VALVE (CAGE 30003) (Note 2 and 3)	1	
-3	MS26545B2C0415	. . . CO ₂ CYLINDER (CAGE 96906) (NIIN 00-595-3698) (Note 3)	1	
-4	9153	. . . MANIFOLD (CAGE 97375) (NIIN 00-075-9389)	1	
	C50890	. . . MANIFOLD (CAGE 08407)	1	
-5	1106AS102-1	. . . HOUSING ASSEMBLY (CAGE 30003) (NIIN 00-141-0721)	1	
-6	1106AS104-1	. . . CABLE ASSEMBLY (CAGE 30003) (NIIN 00-107-1656)	1	
-7	MIL-A-3339	. . SEA ANCHOR, Type I, Size 3 (NIIN 00-850-6552) (Note 5)	1	
<p>Notes: 1. Inflatable 20-man liferaft P/N 63A80H1-601 is the bare liferaft without the inflation system and survival items. Once configured with inflation assembly parts as listed, and with the inlet check valve removed in accordance with paragraph 11-69, the LRU-15/A liferaft becomes P/N63A80H1-301 for C-130 wing installation, which cannot be requisitioned as a complete assembly.</p> <p>2. Item is no longer procured or stocked. Item may be obtained through salvage.</p> <p>3. The CO₂ cylinder and inflation valve P/N 63A120H1-71 when assembled as a unit becomes (CAGE 30003) P/N 63A120H1-16, which can be requisitioned as a complete assembly.</p> <p>4. The carrying case for C-130 wing installation may be fabricated in accordance with paragraph 11-67.</p> <p>5. Due to low demand, sea anchors may not be stocked. They may be open purchased from the Patten Co, 1803 Madrid Ave, Lake Worth, FL (561) 588-8500.</p> <p>6. The LRU-15/A 20 person life raft is being replaced by the new 20 person MPLR LRU-32/A, P/N 64510-101, on an attrition basis, for all aircraft applications except the C-130. C-130 units must continue to use the LRU-15/A due to the unique wing installation. All other aircraft operators must order the new MPLR. See Chapter 12 for MPLR information.</p>				

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
MIL-A-3339	11-29-7	PADZZ
	11-30-7	PADZZ
MS26545B2C0415	11-29-3	
	11-30-3	PA--Z
1106AS102-1	11-29-5	PAOZZ
	11-30-5	PAOZZ
1106AS103-1	11-29-6	PAOZZ
1106AS104-1	11-30-6	PAOZZ
C50890	11-29-4	
	11-30-4	

Part Number	Figure and Index Number	SM&R Code
63A80H1-601	11-29-1	PAOGG
	11-30-1	PAOGG
63A80H6-1	11-29-10	PAOGG
63A80H6-13	11-29-8	
63A120H1-71	11-29-2	XBOZZ
	11-30-2	XBOZZ
9153	11-29-4	
	11-30-4	PAOZZ

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CHAPTER 12

MULTI-PLACE LIFERAFTS (MPLR) LRU-30/A (8-MAN), LRU-31/A (12-MAN), AND LRU-32/A (20-MAN)

Section 12-1. Description

12-1. GENERAL.

12-2. The MPLR are multi-place liferafts intended for use by aircrewmembers and passengers forced down at sea (figure 12-1). The liferafts come in three sizes: 8-man, 12-man, and 20-man. These liferafts will replace the current LRU-13/A (7-man), LRU-14/A and LRU-14A/A (12-man), and LRU-15/A (20-man) liferafts on an attrition basis. The liferaft is stowed in a readily accessible area inside the fuselage on all applicable aircraft. MPLR are currently not available for C-130 aircraft.

12-3. CONFIGURATION.

NOTE

ACB 992 required all vacuum bags to be opened for inspection of the actuation line. Additionally, a production ECP was ap-

proved by NAVAIR that will remove the vacuum bag and place the rafts in polymer tubs. All reference to vacuum packaging shall be understood to mean sealed bags. Refer to Chapter 13 for the polymer tub configuration.

12-4. The MPLR include the LRU-30/A (8-man liferaft), LRU-31/A (12-man liferaft), and LRU-32/A (20-man liferaft). The liferafts consist of a vacuum-packed liferaft (brick), an accessory container, and a carrying case (figure 12-2 and 12-3). The liferafts are constructed of urethane-coated nylon with thermo-bonded seams. The liferaft is packaged in a clear, vacuum-sealed, flame-retardant, PVC bag. All three size liferafts share the same design differing only in their dimensions. The liferaft design incorporates a self-erecting canopy, an inflation system with a non-shatterable gas vessel, an insulated floor, self-inflating boarding ramps, and two water-activated lights. Other

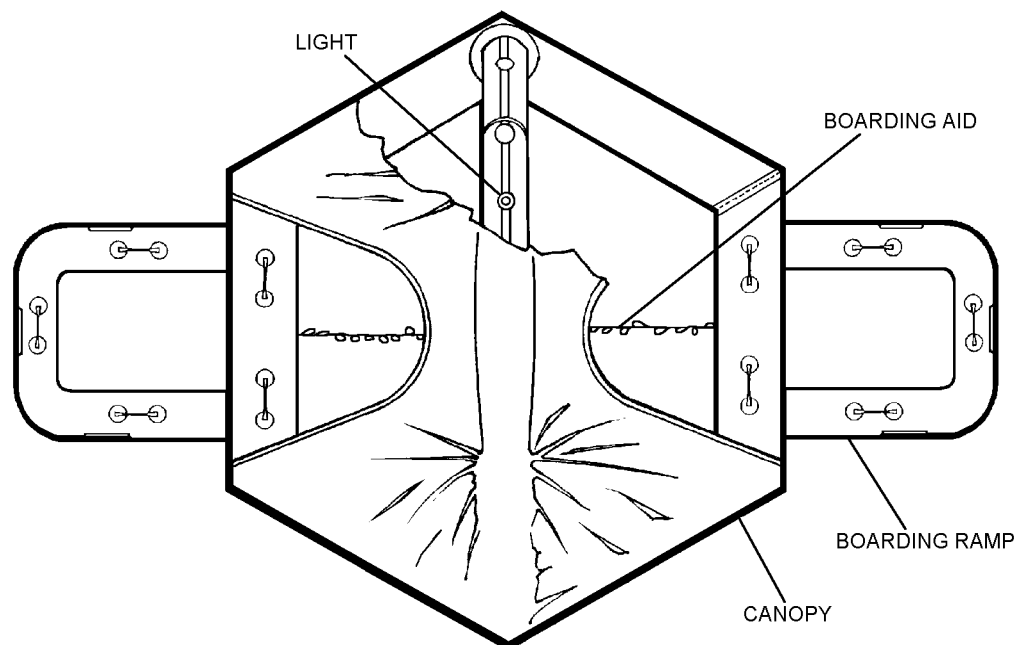
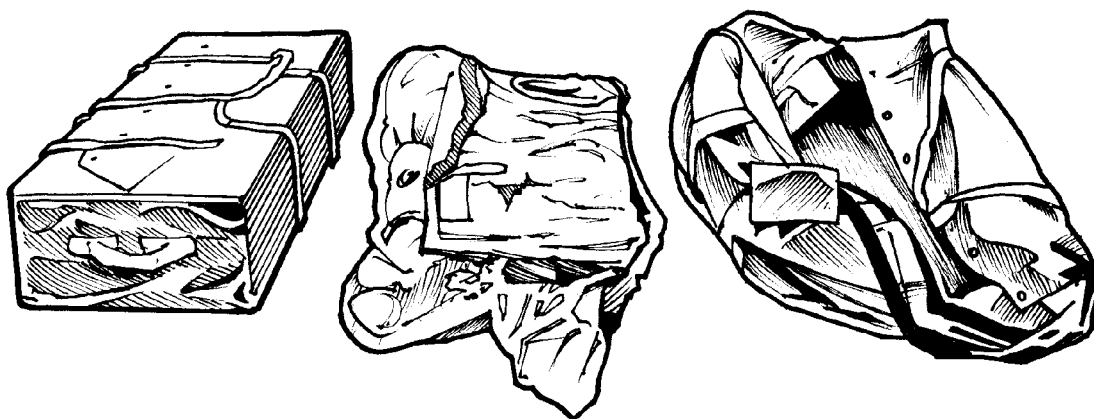


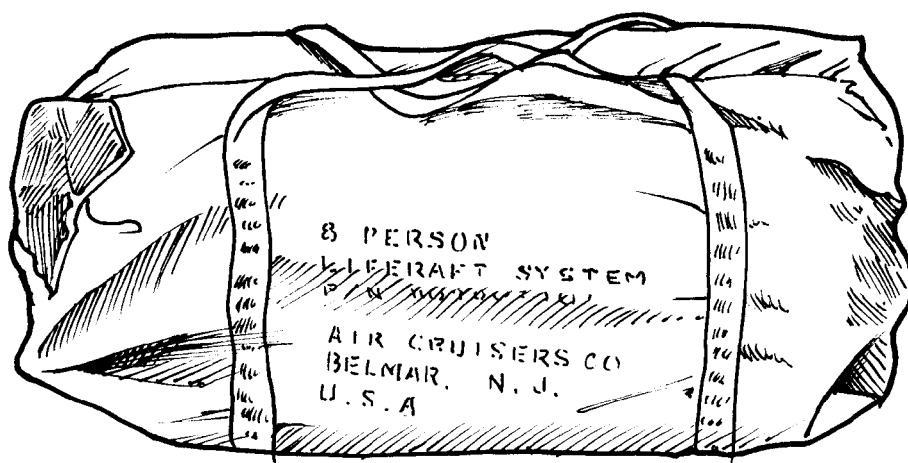
Figure 12-1. MPLR Liferaft Assembly (Inflated)

12-1



012002

Figure 12-2. MPLR Liferaft Assembly Brick, Accessory Container, and Carrying Case



012003

Figure 12-3. MPLR Liferaft Assembly Carrying Case, Packed

features include attached ballast bags and sea anchor, rain water collector, reflective strips, righting aid, hand-pump and top-off valves, lifeline, grasp line, and mooring line.

12-5. The accessory container does not include survival items when received from the manufacturer. It will be packed at the Place-In-Service/Acceptance Inspection (paragraph 12-21). The accessory container is not included inside the vacuum packaging so that life-limited accessories such as bagged water and batteries can be inspected and/or replaced without disturbing the vacuum packaging. The accessory container is tied to the vacuum-packed liferaft and must be pulled into the liferaft after actuation by the survivors.

12-6. The carrying case protects both the vacuum-packed liferaft and the accessory container. The vacuum-packed liferaft rests on top of the accessory container inside the carrying case.

12-7. APPLICATION.

12-8. Multi-place liferafts are authorized for all rotary and fixed wing transport aircraft. Selection shall be

based on mission, available storage space, and total number of crew and passengers carried. Additional consideration shall be made for the liferaft inspection cycle. C-130 series (except the C-130J) wing storage is limited to the LRU-15/A in the wing installation configuration. The C-130J wing storage is limited to the LRU-33/A and the Air Cruisers 46-man P/N 63880-103/104. The V-22 is limited to the LRU-34/A and liferafts listed in the current V-22 flight clearance.

NOTE

The LRU-32/A twenty-man liferaft currently cannot be stowed in the wings of C-130 aircraft. A release device is being tested and will be available in the future.

12-9. FUNCTION.

12-10. The MPLR are inflated by pulling the inflation assembly actuating line located on the end of the carrying case. The inflation assembly inflates the entire liferaft including canopy and boarding ramps.

Section 12-2. Modifications

12-11. GENERAL.

12-12. ACB 992 required all MPLR vacuum bags to be opened for inspection of the actuation line connec-

tion to the actuation valve. The vacuum bags were taped shut and will remain in this configuration until recalled for retrofit into the new polymer tub configuration.

Section 12-3. Maintenance

12-13. GENERAL.

12-14. This section contains information on inspection, packing, and repair/replacement of the MPLR.

12-15. INSPECTION.

12-16. All MPLR assemblies shall be subjected to Place-In-Service, Daily/Pre-Flight, Acceptance, and 448-Day Inspections. The 448-Day Inspection may be performed to coincide with the periodic maintenance requirements of the aircraft on which they are installed.

12-17. The Place-In-Service Inspection shall be performed on all new assemblies, or assemblies being returned from vendor repair or overhaul. The Aircraft Intermediate Maintenance Department performs this inspection. Acceptance Inspection shall be performed in conjunction with aircraft transfer only.

12-18. The Daily/Preflight Inspection shall be performed on fuselage-installed MPLR prior to the first flight of the day. This inspection shall be performed by line personnel (plane captain, etc.) or delegated aircrewmember who have been designated by the line division officer, instructed and found qualified by the Aviator's Equipment Branch.

12-19. The MPLR inspection cycle is 448 days. MPLR are repacked at a designated vendor site every five years. The 448-Day Inspection is for the installed survival equipment and visual inspection of the liferaft assembly. MPLR shall be inducted to the aircraft intermediate maintenance department for the 448-Day Inspection. MPLR may be inducted coinciding with the periodic maintenance requirements of the aircraft on which it is installed, not to exceed 448 days. In no case shall the inspection cycle go beyond the service life of installed radios. MPLR can be inducted during the aircraft inspection (Special/Phase/ISIS) or deferred to its 448-Day Inspection at the discretion of the assigned maintenance department.

12-20. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentmen shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

12-21. PLACE-IN-SERVICE/ACCEPTANCE INSPECTION. To perform a Place-In-Service/Acceptance Inspection, proceed as follows:

Quantity	Materials Required	
	Description	Reference Number
As Required	Thread, Nylon, Size E	V-T-295 NIIN 00-204-3384
As Required	Cloth, Lint Free, Type II	MIL-C-85043 NIIN 01-044-9281

1. Inspect carrying case for cuts, tears, defects, and abrasions.

2. Inspect straps and handles for security and defects.

NOTE

Do not untie any lanyards unless directed.

3. Open carrying case by removing ripcord pin and unlacing daisy chain. Carefully remove vacuum-packed liferaft and place on lint free cloth.

- 4. Deleted.
- 5. Inspect vacuum-pack bag for cuts, tears, defects, and/or abrasions.
- 6. Untie accessory container lanyard at the accessory container.
- 7. Remove accessory container. Inspect for cuts, tears, defects, and/or abrasions.
- 8. Inspect straps and handles for security and defects.
- 9. Check any other parts for wear, damage, and security.

NOTE

- Since the MPLR are being phased in, survival items should be used from the liferaft the MPLR is replacing. If not replacing a BCM'd liferaft, survival items must be ordered.
- 10. Pack survival items in accessory container in accordance with paragraph 12-22.
 - 11. Repack brick and accessory container into carrying case in accordance with paragraph 12-24.
 - 12. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.
 - 13. Ensure manufacturer's history record is enclosed in pocket provided on liferaft container.

12-22. PACKING OF SURVIVAL ITEMS IN ACCESSORY CONTAINER. The survival items

shall be packed into the accessory container at the Place-In-Service Inspection by the intermediate level of maintenance. The procedures shall be as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Cord, Nylon, Type III	NIIN 00-240-2146
As Required	Wrap, Cushioning	NIIN 00-142-9008
As Required	Tape, Pressure-sensitive	NIIN 00-266-5016

1. Inspect survival items in accordance with paragraph 12-23. Refer to table 12-1 for items used and quantity for liferaft size.

NOTE

- NAVAIR 13-1-6.5 contains information on inspection/replacement and modifications to the survival items.
- 2. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap (NIIN 00-142-9008) and secure with rubber bands.
 - 3. Stow accessories and survival items in accessory container in accordance with Figure 12-4.
 - 4. Tie MROD and radios to accessory container tie down loops with 48-inch length of Type III nylon cord. Ensure that a bowline knot is applied.

WATER STORAGE BAGS	BLANKET, SPONGE	CORD, KNIFE, CODE CARD	CHEM. LIGHTS, WHISTLE, MIRROR	FIRST AID CREAM
FOOD PACKETS	FLASHLIGHT			SUN LOTION
	FLARES		STROBE LIGHT	RADIOS, BATTERIES
	SEA DYE MARKER		COMPASS	
FIRST AID KIT	MROD			DESALTER KITS, BAGGED WATER

Figure 12-4. Required Survival Item Stowage

Table 12-1. MPLR Survival Items

Description	Quantity Required			Reference Number	NIIN	SM&R Code
	8-man	12-man	20-man			
Desalter Kit, Sea Water, MK2, Type II (Not E7)	5	6	10	MIL-D-5531	00-372-0592	PAOZZ
Sea Dye Marker	4	5	8	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal MK-124 MOD 0 or Signal Kit, MK-189 MOD 0 (Not E9)	7 1	8 1	10 1	DL 313734 —	01-030-8330 L564-1370-01-418-2657	— —
Water Storage Bag	3	4	7	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Not E8) w/ MROD w/o MROD	8 20	12 30	20 50	—	01-124-4543	PAOZZ
First Aid Kit	1	1	2	SC-C-6545-IL	00-922-1200	—
Desalinator, Manual Reverse Osmosis	1	1	1	—	01-313-6086	—
Sunburn Preventative Preparation	1	2	3	MIL-S-37800	01-121-2336	PAOZZ
Food Packet, Liferaft	8	12	20	MIL-F-15281	01-028-9406	PAOZZ
Bailing Sponge	1	4	6	L-S-626	00-240-2555	PAOZZ
Combat Casualty Blanket Type I	1	2	3	MIL-B-36964	00-935-6665	PAOZZ
Hand Generated Flashlight A-9 (Not E2)	1	1	1	MIL-F-8209	00-283-9806	PAOZZ
Flare Gun MK-79 MOD 0 (Note D)	1	1	2	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or SDU-39/N	1	1	1	MIL-L-38217	00-067-5209 00-411-8535	PAOZZ PAOZZ
Light, Chemical	2	2	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Not E3) or Signal Mirror, Type II	1	1	1	MIL-M-18371	00-105-1252 01-455-6695 01-455-6671	PAOZZ PAOZZ PAOZZ
Survival Radio (Notes 4 and 6) and/or Radio Beacon AN/URT-33A (Not E4)	1	1	1	MIL-B-38401	00-160-2136	PAOGG
Code Card (Not E3)	1	1	1	—	—	—
Whistle Type II	1	1	1	MIL-W-1053	00-254-8803	PAOZZ
Compass, Pocket, Type MC-1 (Note) or Compass, Wrist	1	1	1	MIL-C-17850 WCC-100	00-515-5637 00-809-5252	PAOZZ PAOZZ
Pocket Knife	1	1	1	MIL-K-818	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	1	1	MIL-C-5040	00-240-2154	PAOZZ

Table 12-1. MPLR Survival Items (Cont)

Description	Quantity Required			Reference Number	NIIN	SM&R Code
	8-man	12-man	20-man			
Notes: 1. Use MIL-C-17850 until stock is depleted, then use WCC-100. 2. Required for Arctic missions; optional otherwise. 3. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted. 4. Survival Radio or Radio Beacon requirements shall be in accordance with OPNAVINST 3710.7 Series. Following radios apply: Voice-Beacon: AN/PRC-90, AN/PRC-90-2, and AN/PRC-149, Beacon only: AN/URT-33, AN/PRT-5, and AN/PRC-140. The AN/PRC-149 will become the preferred radio when available. 5. Refer to NAVAIR 13-1-6.5. 6. Ensure battery service life does not expire prior to the next scheduled special inspection. Refer to applicable radio maintenance publication for battery service life. 7. Authorized for use in Arctic/Antarctic environments. 8. MROD shall be installed if available. MPLR is considered RFI without MROD provided bagged water is increased. MROD should not be used where water temperatures are below 36°F. 9. MK-189 MOD 0 Signal Kit contains 6 MK-124 Day/Night flares and 2 MK-79 MOD 0 flare guns. If used, it fills flare requirements.						

5. Secure latches on first aid kit with several layers of pressure-sensitive tape (NIIN 00-266-5016). Using an 8-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit on the inside of the kit latches and tie with a surgeon's knot. Route opposite end of cord to accessory container tie down loop and secure with a bowline knot. Stow first aid kit in accessory container.

until the next inspection cycle of the completed assembly.

1. Inventory all accessory and survival items by checking items against [table 12-1](#). Replace missing or unsatisfactory items.

NOTE

12-23. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

Refer to NAVAIR 13-1-6.5 for information on inspection/replacement and modification of survival items.

With the exception of batteries, items reaching over-age while packed in survival kits and liferafts shall remain in service

Ensure radio battery service life does not expire prior to the next scheduled calendar inspection. Refer to applicable radio maintenance publication for battery service life. Batteries which do not meet service life requirements must be discarded regardless of their condition.

2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

3. Operate all items which are not expended in use. Replace as necessary.

12-24. ACCESSORY CONTAINER AND LIFERAFT PACKING PROCEDURES. To pack the accessory container and the vacuum-packed liferaft into the carrying case proceed as follows:



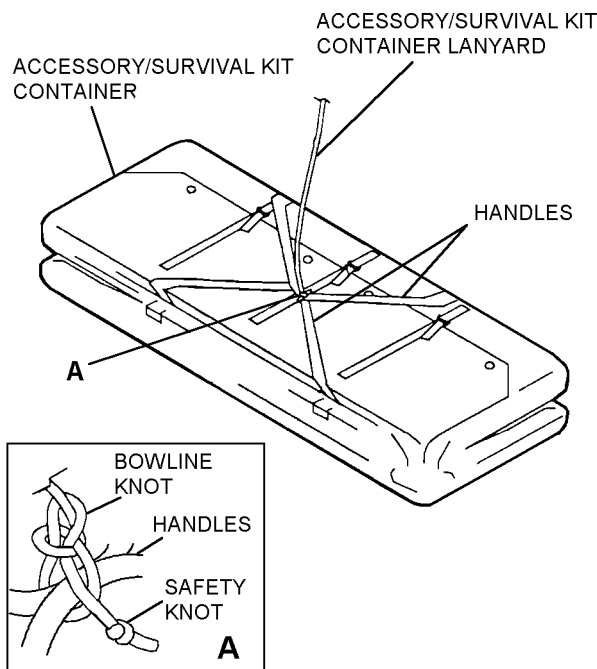
Do not place accessory container in carrying case with snap side up. Snap side of container may damage vacuum-packed liferaft.

Materials Required		
Quantity	Description	Reference Number
As Required	Thread, Nylon, Size E	V-T-295 NIIN 00-204-3384

WARNING

If survival kit retaining line is not properly secured to survival kit handles and liferaft, the survival kit will be lost upon deployment of the liferaft, leaving survivors without emergency supplies and communication equipment.

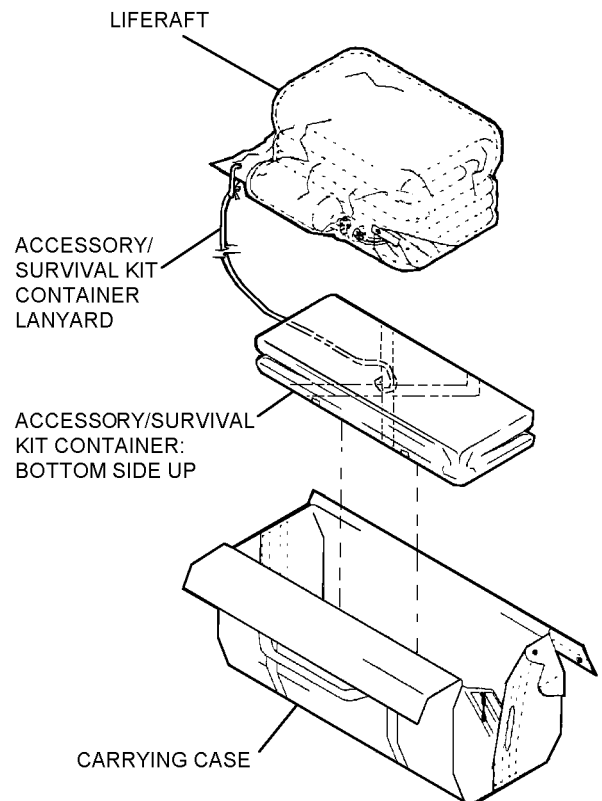
1. Re-tie accessory/survival kit container to liferaft bag using retaining line removed in step 6., paragraph 12-21. Using bowline knot, secure around center handles of survival kit container. Tack bowline knot with size E thread, one turn, secure with surgeon's and square knot. Ensure opposite end of retaining line is secured to liferaft bag, near base of carbon dioxide bottle, with a bowline knot.



Step 1 - Para 12-24

12p24s1

2. Place accessory container into carrying case by rotating accessory container upside down (snaps down) ensuring MROD side will be opposite CO₂ cylinder for even weight distribution. The accessory/survival kit container lanyard shall be routed to the end of the carrying case.

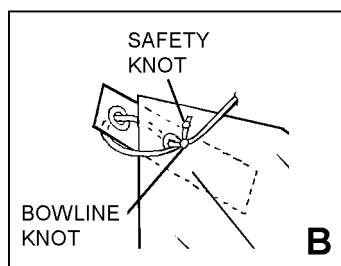
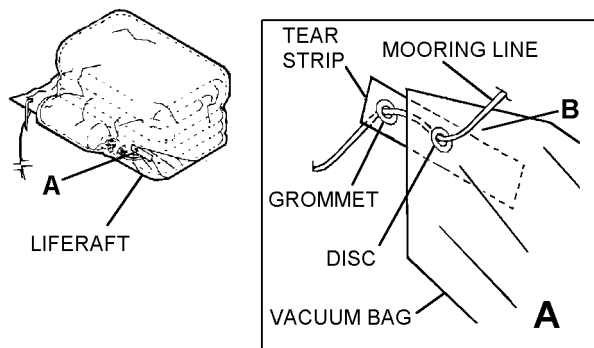


Step 2 - Para 12-24

12p24s2

NAVAIR 13-1-6.1-1

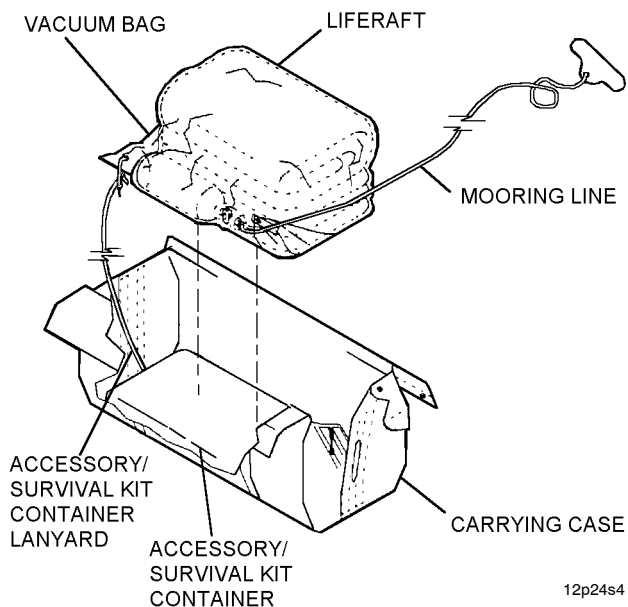
3. Ensure inflation lanyard is routed through tear strip and mooring line disc on brick.



Step 3 – Para 12-24

12p24s3

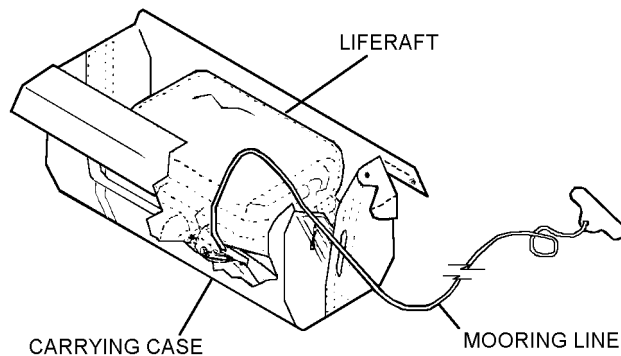
4. Place brick in carrying case so base of CO₂ cylinder is opposite ripcord end.



Step 4 – Para 12-24

12p24s4

5. Ensure inflation lanyard (mooring line) is routed on top center of brick to exit at ripcord end.

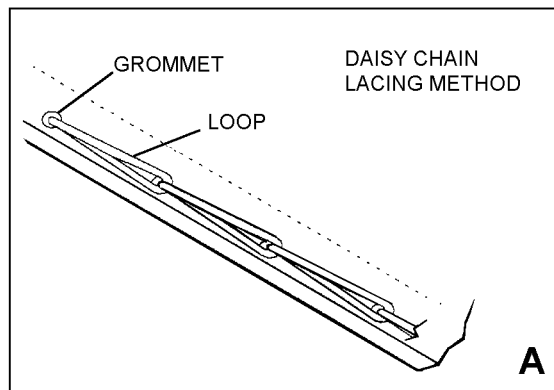
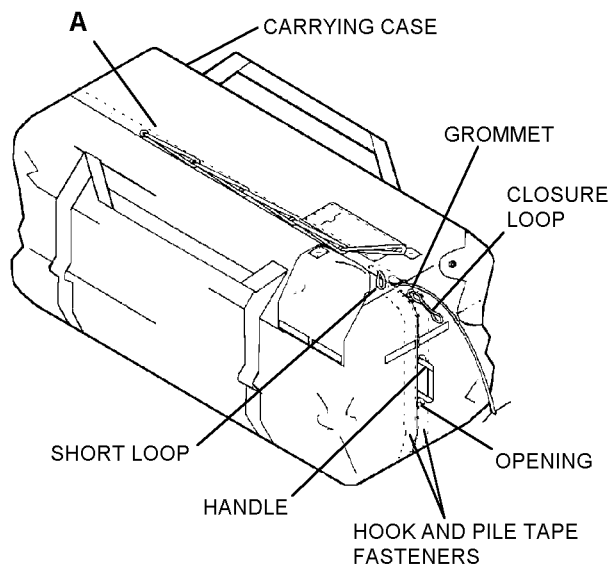


12p24s5

Step 5 – Para 12-24

6. Close carrying case ends. Ensure handles are routed through opening and hook and pile tape is secure.

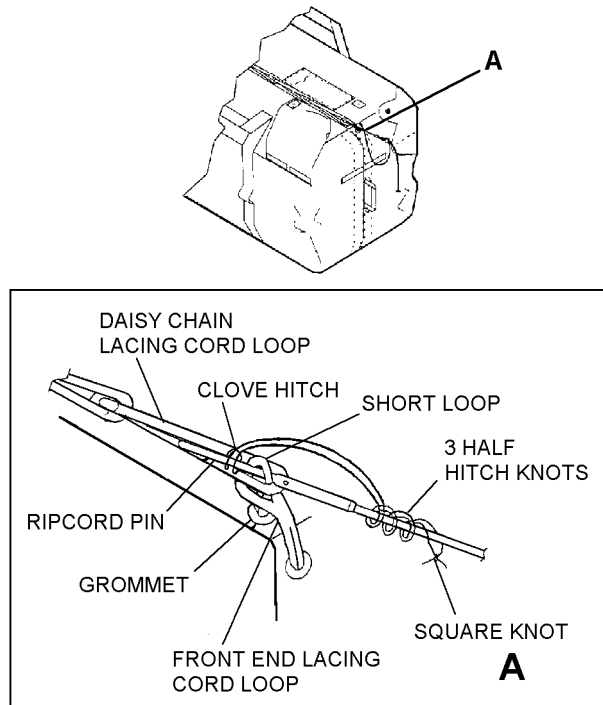
7. Close carrying case using Daisy Chain Lacing Method.



12p24s7

Step 7 – Para 12-24

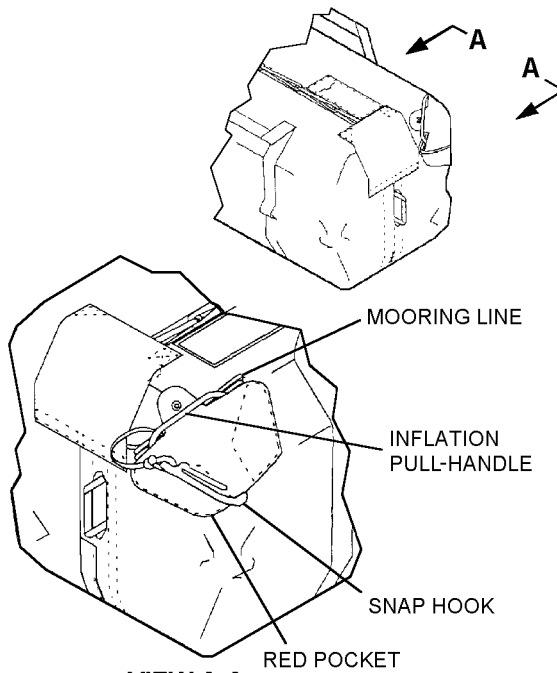
8. Install inflation lanyard (mooring line) ripcord pin and safety tie using size E nylon thread.



12p24s8

Step 8 - Para 12-24

9. Accordion fold excess inflation lanyard (mooring line) into ripcord cover pocket. Place inflation pull handle in pocket.



VIEW A-A

Step 9 - Para 12-24

12p24s9

10. Secure protective flaps over daisy chain and ripcord.

11. Ensure inflation lanyard (mooring line) is routed through case opening after securing protective flap with hook and pile tape.

12-25. DAILY/PREFLIGHT/30-DAY SPECIAL INSPECTION. To perform a Daily/Preflight/30-day Special Inspection, complete the following procedures.

1. Inspect carrying case for cuts, tears, deterioration, and abrasion.

2. Inspect straps and handles for security and deterioration.

3. Inspect carrying case for stains, dirt, and general condition.

4. If necessary, clean in accordance with paragraph 12-26.

5. Check any other visible parts for wear, damage, and security.

6. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

12-26. DELETED.

12-27. 448-DAY INSPECTION. The 448-Day Inspection is performed at the intermediate maintenance department and may be accomplished to coincide with the periodic maintenance requirements of the aircraft on which the liferaft is installed, but shall not exceed 448 days. To perform the 448-Day Inspection, proceed as follows:

CAUTION

Ensure liferaft is placed on lint free cloth to avoid damage.

NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modifications to the survival items.

Materials Required		
Quantity	Description	Reference Number
As Required	Thread, Nylon, Size E	V-T-295 NIIN 00-204-3384
As Required	Cloth, Lint Free, Type II	MIL-C-85043 NIIN 01-044-9281

NAVAIR 13-1-6.1-1

1. Inspect carrying case for cuts, tears, defects, and abrasions.

2. Inspect straps and handles for security and defects.

3. Carrying case for stains, dirt, and general condition.

4. If necessary, clean in accordance with paragraph 12-31.

5. Open carrying case and carefully remove vacuum-packed liferaft and place on lint free cloth.

6. Check integrity of liferaft, check for holes in storage bag that may have penetrated/damaged raft.

7. If liferaft storage bag has holes that have penetrated/damaged raft, remove from service and process lifteraft in accordance with paragraph 12-40.

8. Deleted

9. Untie and remove accessory container and inspect for cuts, tears, defects, and/or abrasions.

10. Inspect straps and handles for security and defects.

11. Check any other parts for wear, damage, and security.

12. Inspect survival items for expiration and damage (paragraph 12-23). Ensure installed radio has been inspected in accordance with applicable maintenance manual and will remain RFI until the next

scheduled 448-Day Inspection. Refer to paragraph 12-1 for items used.

12A. Re-stow survival items in accessory container in accordance with paragraph 12-22.

13. Re-stow accessory/survival kit and liferaft in carrying case and close in accordance with paragraph 12-24.

14. Deleted.

15. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

16. Ensure manufacturer's history record is enclosed in pocket provided on liferaft container.

12-28. 5-YEAR REPLACEMENT. After 5 years of service, the MPLR shall be removed from the aircraft and forwarded to the contractor for re-certification. See paragraph 12-40 for procurement and contractor information. To perform the 5-year inspection, proceed as follows:

NOTE

Re-certification requires 10-day turnaround.

1. Remove liferaft assembly from aircraft.

2. Open carrying case and remove vacuum-packed liferaft.

3. Untie inflation lanyard and accessory container lanyard. Maintain lanyards with carrying case.

4. Process liferaft in accordance with [paragraph 12-40](#) for re-certification. Ensure manufacturer's history record is returned with raft for proper documentation during service of unit.

5. Remove accessory container and inspect for cuts, tears, defects, and/or abrasions.

6. Inspect straps and handles for security and defects.

7. Inspect carrying case for cuts, tears, defects, and abrasions.

8. Inspect straps and handles for security and defects.

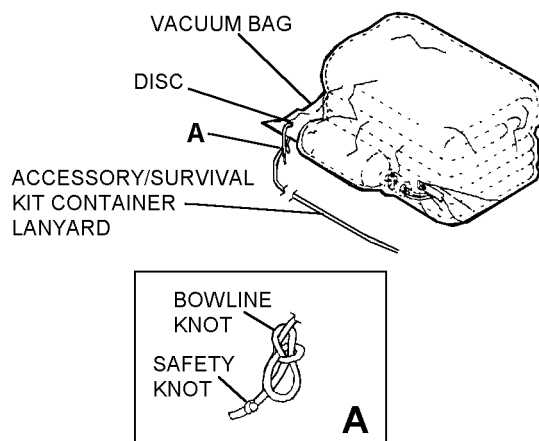
9. Check any other parts for wear, damage, and security.

10. Inspect survival items for expiration and damage ([paragraph 12-23](#)). Refer to [table 12-1](#) for items used.

11. Repack re-certified or replacement liferaft in accordance with [paragraph 12-29](#).

12-29. REPACK OF RE-CERTIFIED OR REPLACEMENT LIFERAFT. To repack a re-certified or replacement liferaft, proceed as follows:

1. Obtain replacement or re-certified liferaft.
2. Tie accessory container lanyard to brick. Secure with bowline knot.



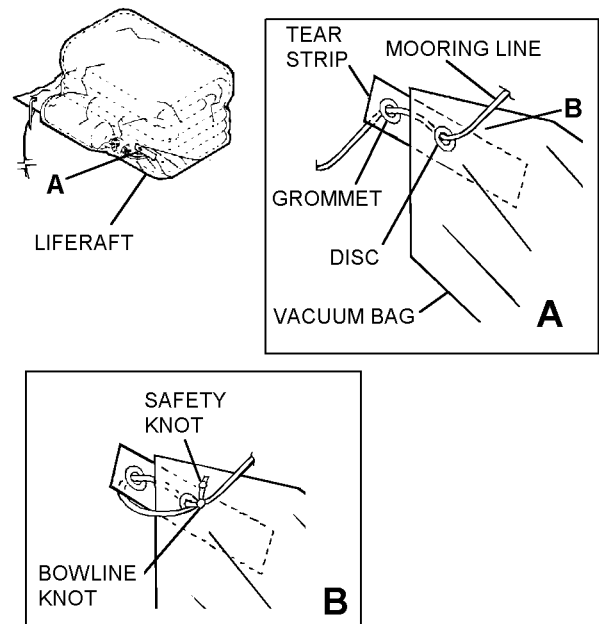
12p29s2

Step 2 - Para 12-29



Use extreme care when handling tear strip as excessive pulling may break vacuum.

3. Tie inflation lanyard (mooring line) to the brick by routing through tear strip grommet and brick disc. Secure with bowline knot.



12p29s3

Step 3 - Para 12-29

4. Pack accessory container and brick in carrying case in accordance with [paragraph 12-24](#).

12-30. CLEANING AND SERVICING.

12-31. CLEANING OF MPLR. To clean, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint Free, Type II	MIL-C-85043 NIIN 01-044-9281



Solvents are not to be used in the cleaning of MPLR.

Use extreme care when cleaning around the area surrounding tear strip.

1. Dab or blot excess oil, fluid or dirt off of area being cleaned. Do not rub into material.

NAVAIR 13-1-6.1-1

2. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

3. Clean affected area with lint free cloth or sponge.

4. Dry with a lint-free cloth.

12-32. REPAIR/REPLACEMENT.

12-33. This section contains instruction for the repair and replacement of the MPLR and its components to ensure that the MPLR remains in Ready-For-Issue (RFI) status. Only minor repairs to the carrying case or accessory container are authorized. Any defects to the vacuum-packed liferaft (e.g. rips, tears, abrasions, etc.) are to be repaired by the contractor. See paragraph 12-40 for information on liferaft processing.

12-34. Repair/replacement of minor rips, tears, abrasions, and other defects to the carrying case and/or accessory container are authorized. All repairs shall be documented by making necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

12-35. WARRANTY.

12-36. NEW LIFERAFTS AND LIFERAFT ASSEMBLIES. For a period of sixty (60) months after initial shipment to USN, the manufacturer warrants the following:

1. The liferaft shall conform to the applicable specification (MIL-PRF-18494).

2. Deleted.

3. The liferaft shall be free from defects in material and workmanship.

12-37. AFTER INSPECTION, REPAIR, AND REPACKAGING OF RETURNED LIFERAFTS. For a period of sixty (60) months after inspection, repair, and repackaging of returned liferafts, the manufacturer warrants the following with regard to the vacuum bag and vacuum-packed liferaft:

1. The liferaft shall conform to the applicable specification (MIL-PRF-18494).

2. Deleted.

3. The liferaft shall be free from defects in material and workmanship.

12-38. FURTHER WARRANTIES. The manufacturer further warrants any repaired or replaced items for a period of thirty-six (36) months from date of shipping to the USN.

12-39. With respect to any liferaft that does not conform with the foregoing warranties, USN shall return the liferaft to the manufacturer within the warranty period. See paragraph 12-40 for information on liferaft processing.

12-40. PROCESSING/RETURNING VACUUM-PACKED LIFERAFT BRICKS TO MANUFACTURER.

NOTE

MPLR that were opened IAW ACB 992 should not be returned to vendor for loss of vacuum. Only rafts that have damage or suspected damage that would render them non-RFI shall be returned to the vendor. All rafts opened in accordance with ACB 992 will be recalled for reconfiguration packaging on a scheduled basis through notification by TYCOM.

Ensure manufacturer's history record is returned with raft for proper documentation during service of unit.

1. Damaged liferafts.

a. If there is no visible damage, process liferaft under warranty provisions of OPNAVINST 4790.2 series.

b. Liferafts that have visible damage that will not meet warranty specifications shall be returned for repair and repack.

12-41. MPLR ORDERING INFORMATION.

NOTE

The LRU-30/A, LRU-31/A, and LRU-32/A MPLR are no longer available. They have been replaced by the LRU-30A/A, LRU-31A/A, and LRU-32A/A.

1. The following multiplace liferafts (MPLR) (table 12-2) are authorized for use on Navy Air-

craft. They are obtained from the GSA Schedule via open purchase using normal supply procedures. MPLR are replacement rafts for LRU-13/, -14/, and -15/ series rafts and are not a new capability.

2. GSA contract number GS-07F-0133K, is established for Air Cruisers Company, P.O. Box 180, Highway 34 South and Allaire Airport, Belmar, NJ, 07719-0180. Phone (732) 681-3527. Additional information may be obtained from the GSA Advantage Website at: www.gsaadvantage.gov.

Table 12-2. MPLR Ordering Information

Item Description	Designation	Part Number	NIIN
Liferaft Assembly, 8 Person, Vacuum Packed (Note 1)	LRU-30/A	64490-101	01-484-6113
Carrying Case, 8 Person Raft (Note 2)	N/A	64607-101	01-484-6116
Accessory Bag, 8 Person Raft (Survival Equipment Container) (Note 2)	N/A	64610-101	01-484-6120
Liferaft, 8 Person, Vacuum packed (Note 3)	Brick	64616-101	01-484-6123
Liferaft Assembly, 12 Person, Vacuum Packed (Note 1)	LRU-31/A	64500-101	01-484-6124
Carrying Case, 12 Person Raft (Note 2)	N/A	64608-101	01-484-6125
Accessory Bag, 12 Person Raft (Survival Equipment Container) (Note 2)	N/A	64611-101	01-484-6126
Liferaft, 12 Person Vacuum Packed (Note 3)	Brick	64617-101	01-484-6128
Liferaft Assembly, 20 Person, Vacuum Packed (Note 1)(Note 4)	LRU-32/A	64510-101	01-484-6130
Carrying Case, 20 Person Raft (Note 2)	N/A	64609-101	01-484-6138
Accessory Bag, 20 Person Raft (Survival Equipment Container) (Note 2)	N/A	64612-101	01-484-6140
Liferaft, 20 Person Vacuum packed (Note 3)	Brick	64618-101	01-484-6146
Notes: 1. Assembly includes vacuum packed life raft, carrying case, and equipment container. 2. Single item by part number only. 3. Vacuum packed raft (brick) only. 4. Not authorized for C-130 wing nacelle installation.			

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CHAPTER 13

MULTI-PLACE LIFERAFTS (MPLR A/A), LRU-30A/A (8-MAN), LRU-31A/A (12-MAN), AND LRU-32A/A (20-MAN)

Section 13-1. Description

13-1. GENERAL.

13-2. The MPLR are multi-place liferafts intended for use by aircrewmembers and passengers forced down at sea (figure 13-1).

13-3. CONFIGURATION.

13-4. The newly configured MPLR LRU-30A/A (8-man), LRU-31A/A (12-man), and LRU-32A/A (20-man) consist of the liferaft in a polymer tub with a cover, and webbing straps with frangible links. The tub cover has a clear window for verification of the carbon dioxide bottle charge. The frangible links are designed to break at 180 pounds of force as the liferaft expands when actuated. The tub assembly is stowed in a newly configured container that incorporates protective skids on the bottom for horizontal storage and at the end opposite of the inflation pull handle for vertical stowage. The container is custom fitted to the tub, streamlining the overall package. This new configuration functions exactly as the old vacuum bagged version, only packaging of the liferaft and container have changed, the liferafts themselves are unchanged.

13-5. APPLICATION.

13-6. Multi-place liferafts are authorized for all rotary and fixed wing transport aircraft. Selection shall be based on mission, available storage space, and total number of crew and passengers carried. Additional consideration shall be made for the liferaft inspection

cycle. C-130 series (except the C-130J) wing storage is limited to the LRU-15/A in the wing installation configuration. The C-130J wing storage is limited to the LRU-33/A and the Air Cruisers 46-man P/N 63880-103/104. The V-22 is limited to the LRU-34/A and liferafts listed in the current V-22 flight clearance.

13-7. FUNCTION.

13-8. The LRU-30A/A, LRU-31A/A, and LRU-32A/A are inflated by pulling the inflation pull handle attached to the actuation/mooring line. The inflation pull handle and actuation/mooring line are stowed in a pocket at the opposite end of the carrying case that has protective skids (used for vertical storage). The actuation/mooring line has a snaphook attached to the bitter end for attachment to the aircraft or the person(s) launching the liferaft. The newly configured MPLR has a shortened stroke to actuate the liferaft. Pulling the inflation pull handle will fully inflate the liferaft, boarding ramps and canopy. The survival equipment container is tethered to the liferaft and should be retrieved after entering liferaft.

CAUTION

The LRU-30A/A, LRU-31A/A, and LRU-32A/A are not designed to be air dropped. The search and rescue model manager will develop procedures for dropping the MPLR in emergency situations. These procedures will be published in NATOPS when completed.

Section 13-2. Modifications

13-9. GENERAL.

13-10. There are no authorized modifications to the MPLR A/A at this time.

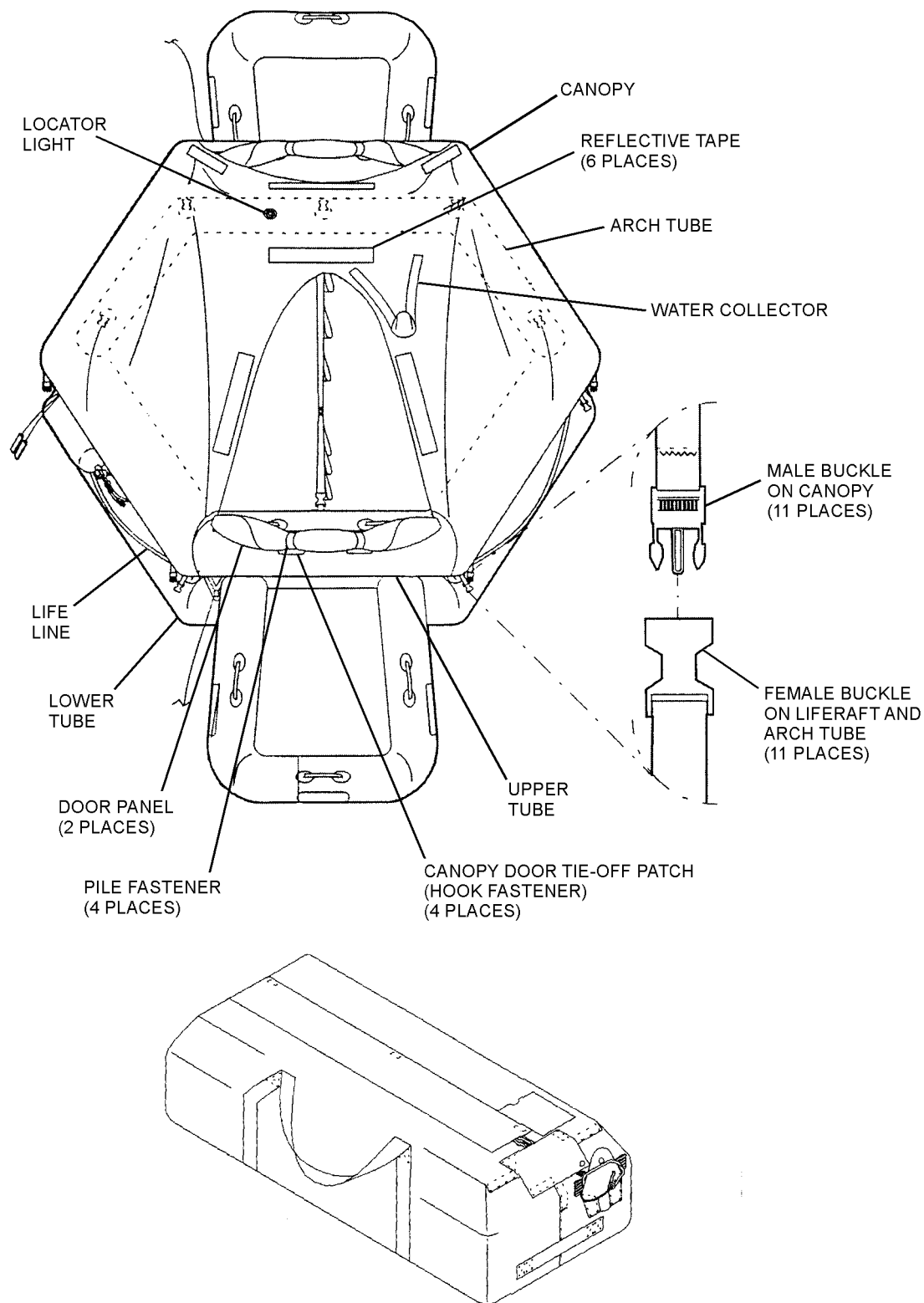


Figure 13-1. Multi-Place Liferaft (MPLR)

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Section 13-3. Maintenance

13-11. GENERAL.

13-12. This section contains information on inspection, packing, cleaning, and repairing the LRU-30A/A, LRU-31A/A, and LRU-32A/A liferafts.

13-13. INSPECTION.

13-14. All MPLR assemblies shall be subject to Place-In-Service, Daily/Pre-Flight, 448-Day, Acceptance, and Five-Year Vendor Overhaul/Repack Inspections.

13-15. Place-In-Service Inspection shall be performed on all new assemblies, and assemblies returned from vendor repair or repack. The aircraft intermediate maintenance department performs this inspection.

13-16. Daily/Pre-flight Inspection shall be performed on fuselage-installed liferafts prior to the first flight of the day. This inspection shall be performed by line personnel (plane captain or delegated aircrewmember) who have been designated, instructed, and found qualified by the aviator's equipment branch.

NOTE

The inspection cycle of the MPLR is limited by the installed survival equipment. The inspection cycle may be adjusted to the inspection cycle of the aircraft in which it is installed, i.e., ISIS or Phase. However, it shall not exceed the service life of the installed radio batteries or 448 days whichever comes first.

13-17. The 448-Day Inspection shall be performed at the AIMD. The interval for MPLR shall not exceed 448 days. In no case shall the cycle go beyond the service life of the installed radio batteries.

13-18. Acceptance Inspection shall be performed in accordance with applicable MIMS and as directed during aircraft transfer.

13-19. Five-Year Vendor Overhaul/Repack Inspection shall be performed every five years. The AIMD and designated vendor perform this inspection. AIMD will remove the liferaft and forward to the designated vendor. AIMD may issue a spare raft and place the

overhauled liferaft in the ALSS pool upon its return from the vendor.

13-20. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentmen shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and, in accordance with OPNAVINST 4790.2 Series, may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

13-21. PLACE-IN-SERVICE INSPECTION. To perform a Place-In-Service Inspection, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Thread, Nylon, Size E	V-T-295 NIIN 00-204-3884

1. Carefully remove liferaft from shipping container. Place liferaft on a clean, flat surface. If possible, save shipping container for future use. Should the liferaft have to be returned for warranty repairs or five-year vendor overhaul/repack, the original container provides excellent form-fit protection.

2. Inspect carrying case for cuts, tears, defects, and abrasions. Inspect attached hardware for security of attachment.

CAUTION

Pulling on inflation pull handle or the attached actuation/mooring line will inflate liferaft.

3. Open carrying case by unsnapping the snaps and separating the hook and pile fastener closures on the

NAVAIR 13-1-6.1-1

protective flaps. Cut and remove the safety tie on the single ripcord pin, then remove the pin and unlace the daisy chain. Unsnap the red inflation pull handle keeper flap and place inflation pull handle and actuation/mooring line next to carrying case.

4. Locate the accessory container on top of the liferaft assembly. It has a white nylon retaining line tied to the handles. This retaining line is attached to the liferaft and enters the tub at the opposite end of the mooring/actuation line. Remove the accessory container and place it next to the liferaft assembly.

5. Untie and remove the white nylon retaining line from the accessory container handles. Pack the accessory container in accordance with paragraph 13-28.

NOTE

Do not remove the frangible links or the cover for the polymer tub in which the liferaft is stowed.

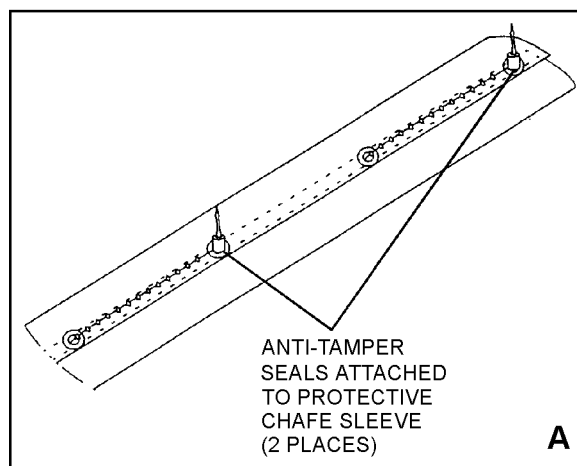
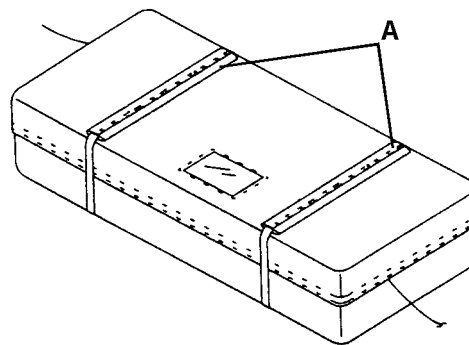
6. Verify the charge in the carbon dioxide cylinder by checking the sight gage located on the inflation valve. The indicator should be in the green. The sight gage is visible through the clear window located in the cover on the polymer tub. If the indicator is in the red, submit a QDR in accordance with OPNAV-INST 4790.2 Series.

NOTE

The manufacturer's record may be kept in the aircraft log book with the seat's record to prevent FOD, or remain with the raft. If manufacturer's record is lost, the liferaft is still considered RFI provided the seat's record is still available.

7. Verify the serial number of the raft against the manufacturer's maintenance record located in the aircraft logbook or in the pocket found on the top of the carrying case. The serial number for the liferaft is found in two locations: on the polymer tub cover and the carrying case.

8. Locate the two liferaft retaining straps that encircle the polymer tub. The straps have urethane coated nylon covers, which protect the frangible links. The covers are secured with hook and pile fastener, and two nylon anti-tamper seals routed through grommets. Inspect the integrity of the anti-tamper seals. If the anti-tamper seals are damaged or broken, submit a QDR in accordance with the OPNAVINST 4790.2 Series.



Step 8 - Para 13-21

13p21s8

9. Pack carrying case in accordance with paragraph 13-29.

13-22. DAILY/PREFLIGHT INSPECTION. To perform a Daily/Preflight Inspection proceed as follows:

1. The Daily/Preflight Inspection on fuselage-installed liferafts shall be accomplished prior to the first flight of the day.

NOTE

Do not break any safety ties or remove ripcord during daily inspection.

2. Inspect carrying case for cuts, tears, and abrasions. Inspect attached hardware for security of attachment.

3. Open daisy chain and ripcord pin covers. Inspect for integrity of ripcord pin safety tie and daisy chain lacing. Close daisy chain and parachute pin covers. Ensure snaps are snapped and hook and pile fasteners are engaged.

4. Make necessary entries on appropriate form(s) in accordance with the OPNAVINST 4790.2 series.

13-23. 448-DAY INSPECTION. To perform a 448-Day Inspection, proceed as follows:

NOTE

The inspection cycle of the LRU-30A/A, LRU-31A/A, and LRU-32A/A is limited by the installed survival equipment. The inspection cycle may be adjusted to the inspection cycle of the aircraft in which it is installed (i.e. ISIS, Phase) however, it shall not exceed the service life of the installed radio batteries or 448 days which ever occurs first.

1. Inspect the carrying case for cuts, tears, and abrasions. Inspect attached hardware for security of attachment. See [paragraph 13-35](#) for authorized repairs.

NOTE

Should the polymer tub need to be removed for cleaning or repair of the carrying case, see [paragraph 13-31](#).

2. Inspect carrying case for dirt and lubricants. Clean carrying case in accordance with [paragraph 13-34](#).



Pulling on inflation pull handle or the attached actuation/mooring line will inflate liferaft

3. Open the carrying case by unsnapping the snaps and separating the hook and pile fastener closures on the protective flaps. Cut and remove the safety tie on the single ripcord pin, then remove the pin and unlace the daisy chain. Unsnap the red inflation pull handle keeper flap and place inflation pull handle and actuation/mooring line next to carrying case.

4. Locate the accessory container on top of the liferaft assembly. It has a white nylon retaining line tied to the handles. This retaining line is attached to the liferaft and enters the tub at opposite end of the

mooring/actuation line. Remove the accessory container and place it next to the liferaft assembly.

5. Untie and remove the white nylon retaining line from the accessory container handles. Inspect the survival items contained in the accessory container in accordance with [paragraph 13-26](#).

6. Verify the charge in the carbon dioxide cylinder by checking the sight gage located on the inflation valve. The indicator should be in the green. The sight gage is visible through the clear window located in the cover on the polymer tub. If the indicator is in the red on the gage, submit NAMDRP report in accordance with OPNAVINST 4790.2 Series.

NOTE

The manufacturer's record shall remain with the raft at all times.

7. Verify the serial number of the raft against the manufacturer's maintenance record card located in the pocket found on the top of the carrying case. The serial number for the liferaft is found in two locations: on the polymer tub cover and the carrying case.

9. Locate the two liferaft retaining straps that encircle the polymer tub. The straps have urethane coated nylon covers, which protect the frangible links. The covers are secured with hook and pile fasteners and two nylon anti-tamper seals routed through grommets. Inspect the integrity of the anti-tamper seals. If the frangible links are damaged or broken, submit an NAMDRP report in accordance with the OPNAVINST 4790.2 Series.

10. Pack carrying case in accordance with [paragraph 13-29](#).

13-24. ACCEPTANCE INSPECTION. To perform an Acceptance Inspection proceed as follows:

NOTE

The Acceptance Inspection may consist of checking history records and visually inspecting the raft. The raft may be inducted to AIMD for further inspection if directed.

1. Locate history records for raft assembly. Verify expiration dates for installed equipment.

2. Visually inspect liferaft carrying case and verify serial numbers that are visible without opening raft.

NAVAIR 13-1-6.1-1

Ensure vendor's liferaft history record is located in the pocket on top of the carrying case.

3. If directed, or if record and visual inspections detect errors, induct raft to AIMD for 448-Day Inspection.

4. Make necessary entries on appropriate form(s) in accordance with the OPNAVINST 4790.2 series.

13-25. FIVE-YEAR VENDOR OVERHAUL/RE-PACK INSPECTION. To perform a Five-Year Vendor Overhaul/Repack Inspection proceed as follows:

1. Organizational:

a. Remove the liferaft assembly from the aircraft in accordance with applicable aircraft MIMS and induct to AIMD.

2. AIMD:

a. Place liferaft on clean flat surface. Open container by unsnapping snaps and separating hook and pile fasteners.

b. Locate and remove accessory container. Remove retaining line from accessory container handles by untying bowline knot. Inspect survival items in accordance with [paragraph 13-26](#).

NOTE

The Accessory Container and its contents are NOT returned to the vendor with the liferaft for the vendor overhaul/repack.

c. Verify liferaft serial number against vendors maintenance record card located in pocket on carrying case.

d. Unsnap the red inflation pull handle keeper flap, place the actuation/mooring line, the inflation pull handle, and the mooring snaphook in the carrying case on top of the liferaft cover.

e. Close carrying case and secure snaps and hook and pile fasteners. Place liferaft in shipping container. Preferred container is type used by vendor for shipping. If no vendor type shipping containers are available, package liferaft to ensure no damage will occur in shipping. If liferaft is damaged in shipping, vendor will add repair charges to repack inspection.

f. Order vendor overhaul/repack on VIDS MAF using [stock number](#) provided in [Section 13-4](#).

g. AIMD shall issue spare raft from ALSS Pool while liferaft undergoes vendor overhaul/repack.

h. Liferafts returned from Five-Year Vendor Overhaul/Repack Inspection shall receive a Place-in-Service Inspection prior to re-issue.

13-26. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

Refer to NAVAIR 13-1-6.5 for information on inspection/replacement and modification of survival items.

With exception of batteries, items reaching over-age while packed in survival kits and liferafts shall remain in service until the next inspection cycle of the complete assembly.

1. Inventory all accessory and survival items by checking [items](#) against [table 13-1](#). Replace missing or unsatisfactory items.

NOTE

Ensure radio battery service life does not expire prior to the next scheduled calendar inspection. Refer to applicable radio maintenance publication for battery service life. Batteries which do not meet service life requirements must not be utilized and shall be turned in to supply for disposal in accordance with local instructions.

2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

3. Operate all items which are not expended in use. Replace as necessary.

4. Pack accessory items into accessory container in accordance with [paragraph 13-28](#).

13-27. PACKING.

13-28. PACKING OF SURVIVAL ITEMS IN ACCESSORY CONTAINER. The survival items shall be packed into the accessory container at the Place-

in-Service Inspection or after removal for 448-Day Inspection by the intermediate level of maintenance. To pack accessory container proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cord, Nylon, Type III	NIIN 00-240-2146
As Required	Wrap, Cushioning	NIIN 00-142-9008
As Required	Tape, Pressure Sensitive	NIIN 00-266-5016

1. Inspect survival items in accordance with paragraph 13-26. Refer to table 13-1 for items use and quantity.

NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modifications to survival items.



Do not use paper tapes such as masking tape to secure cushioning wrap or bubble wrap. Tapes of this type are very difficult to remove when wet.

2. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap and secure with rubber bands.

3. Stow accessories and survival items in accessory container. Pack items evenly to keep the container as flat as possible.

4. Tie MROD (if used) and radios to accessory container tie down loops with 48-inch length of Type III nylon cord, using a bowline knot.

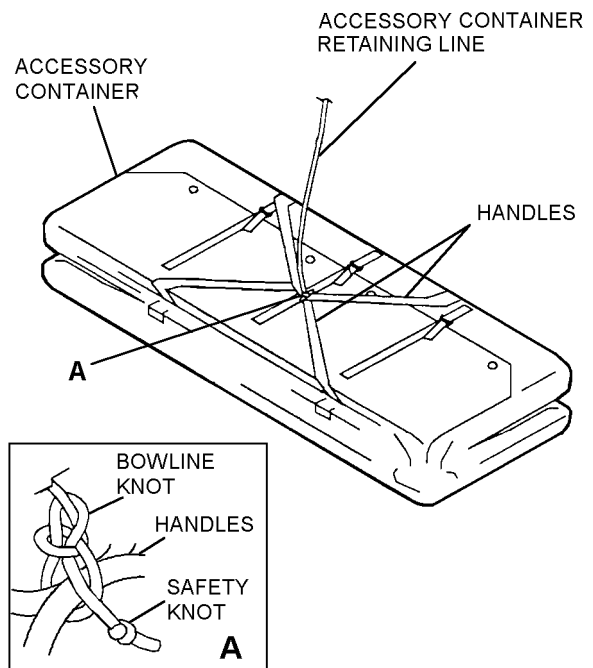
5. Secure latches on first aid kit with several layers of pressure sensitive tape. Using an eight-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns, twice around the first aid kit, on the inside of the latches and tie with a surgeons knot. Route opposite end of cord to accessory container tie down loop and secure with a bowline knot. Stow first aid kit in accessory container.

13-29. PACKING CARRYING CASE. To pack accessory container in carrying case, proceed as follows:

1. Place carrying case with liferaft enclosure assembly on a clean flat surface.

2. Position accessory container retaining line where it exits tub so it is not trapped and place the packed accessory container on top of the liferaft assembly, handles up.

3. Tie the white nylon accessory container retaining line to the center of the handles on the accessory container using a bowline knot. Tack bowline knot with size "E" thread, one turn, secure with surgeon's and square knot. Fake any remaining line at end of container.



Step 3 - Para 13-29

13p29s3

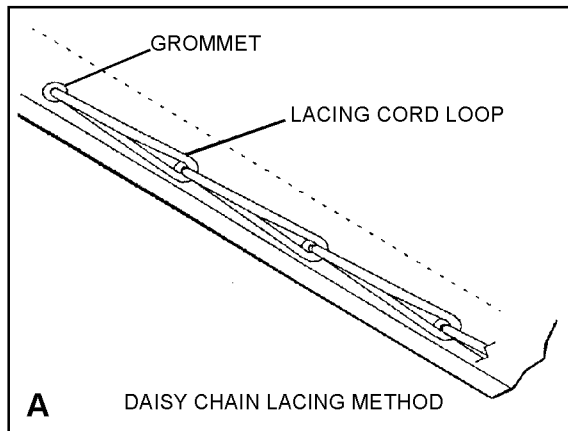
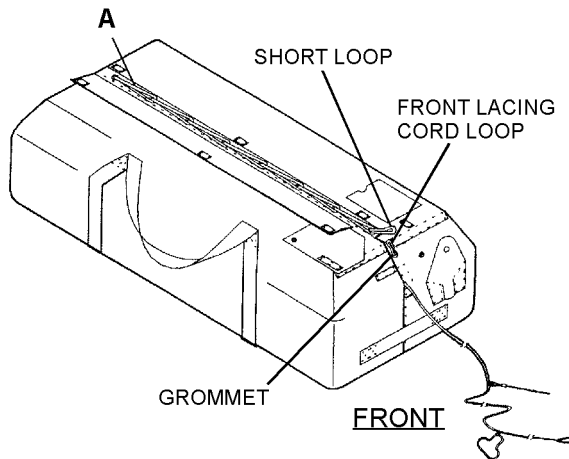
Table 13-1. MPLR Survival Items

Description	Quantity Required			Reference Number	NIIN	SM&R Code
	8-man	12-man	20-man			
Desalter Kit, Sea Water, MK2, Type II (Not E7)	5	6	10	MIL-D-5531	00-372-0592	PAOZZ
Sea Dye Marker	4	5	8	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal MK-124 MOD 0 or Signal Kit, MK-189 MOD 0 (Not E9)	7 1	8 1	10 1	DL 313734 —	01-030-8330 L564-1370-01-418-2657	— —
Water Storage Bag	3	4	7	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Not E8) w/ MROD w/o MROD	8 20	12 30	20 50	—	01-124-4543	PAOZZ
First Aid Kit	1	1	2	SC-C-6545-IL	00-922-1200	—
Desalinator, Manual Reverse Osmosis	1	1	1	—	01-313-6086	—
Sunburn Preventative Preparation	1	2	3	MIL-S-37800	01-121-2336	PAOZZ
Food Packet, Liferaft	8	12	20	MIL-F-15281	01-028-9406	PAOZZ
Bailing Sponge	1	4	6	L-S-626	00-240-2555	PAOZZ
Combat Casualty Blanket Type I	1	2	3	MIL-B-36964	00-935-6665	PAOZZ
Hand Generated Flashlight A-9 (Not E2)	1	1	1	MIL-F-8209	00-283-9806	PAOZZ
Flare Gun MK-79 MOD 0 (Note 9)	1	1	2	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or SDU-39/N	1	1	1	MIL-L-38217	00-067-5209 00-411-8535	PAOZZ PAOZZ
Light, Chemical	2	2	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Not E3) or Signal Mirror, Type II	1	1	1	MIL-M-18371	00-105-1252 01-455-6695 01-455-6671	PAOZZ PAOZZ PAOZZ
Survival Radio (Not E4 and 6) and/or Radio Beacon AN/URT-33A (Not E4)	1	1	1	MIL-B-38401	00-160-2136	PAOGG
Code Card (Not E5)	1	1	1	—	—	—
Whistle Type II	1	1	1	MIL-W-1053	00-254-8803	PAOZZ
Compass, Pocket, Type MC-1 (Note 1) or Compass, Wrist	1	1	1	MIL-C-17850 WCC-100	00-515-5637 00-809-5252	PAOZZ PAOZZ
Pocket Knife	1	1	1	MIL-K-818	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	1	1	MIL-C-5040	00-240-2154	PAOZZ

Table 13-1. MPLR Survival Items (Cont)

Description	Quantity Required			Reference Number	NIIN	SM&R Code
	8-man	12-man	20-man			
Notes: 1. Use MIL-C-17850 until stock is depleted, then use WCC-100. 2. Required for Arctic missions; optional otherwise. 3. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted. 4. Survival Radio or Radio Beacon requirements shall be in accordance with OPNAVINST 3710.7 Series. Following radios apply: Voice-Beacon: AN/PRC-90, AN/PRC-90-2, and AN/PRC-149, Beacon only: AN/URT-33, AN/PRT-5, and AN/PRC-140. The AN/PRC-149 will become the preferred radio when available. 5. Refer to NAVAIR 13-1-6.5. 6. Ensure battery service life does not expire prior to the next scheduled special inspection. Refer to applicable radio maintenance publication for battery service life. 7. Authorized for use in Arctic/Antarctic environments. 8. MROD shall be installed if available. MPLR is considered RFI without MROD provided bagged water is increased. MROD should not be used where water temperatures are below 36°F. 9. MK-189 MOD 0 Signal Kit contains 6 MK-124 Day/Night flares and 2 MK-79 MOD 0 flare guns. If used, it fills flare requirements.						

4. Close the carrying case and lace the daisy chain by inserting the lacing cord loops through the grommets and interconnecting the loops.

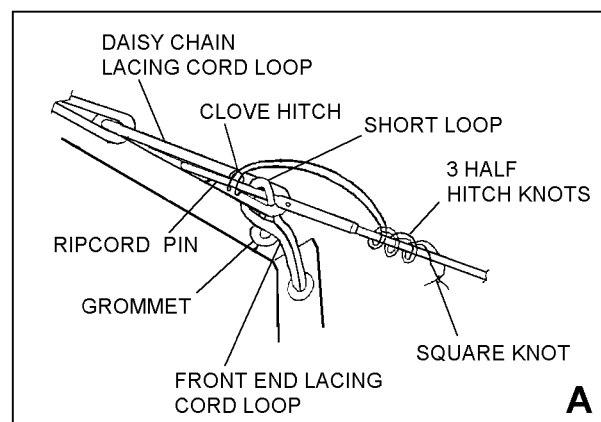
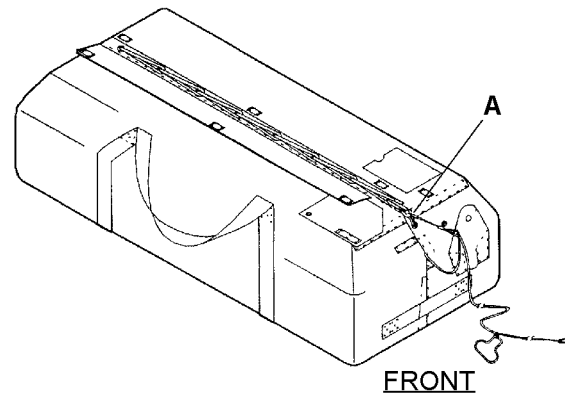


Step 4 - Para 13-29

13p29s4

5. Insert the short loop through the last grommet, place the front lacing cord loop over the short loop, then place the last daisy chain lacing cord loop over the short loop, on top of the front lacing cord loop.

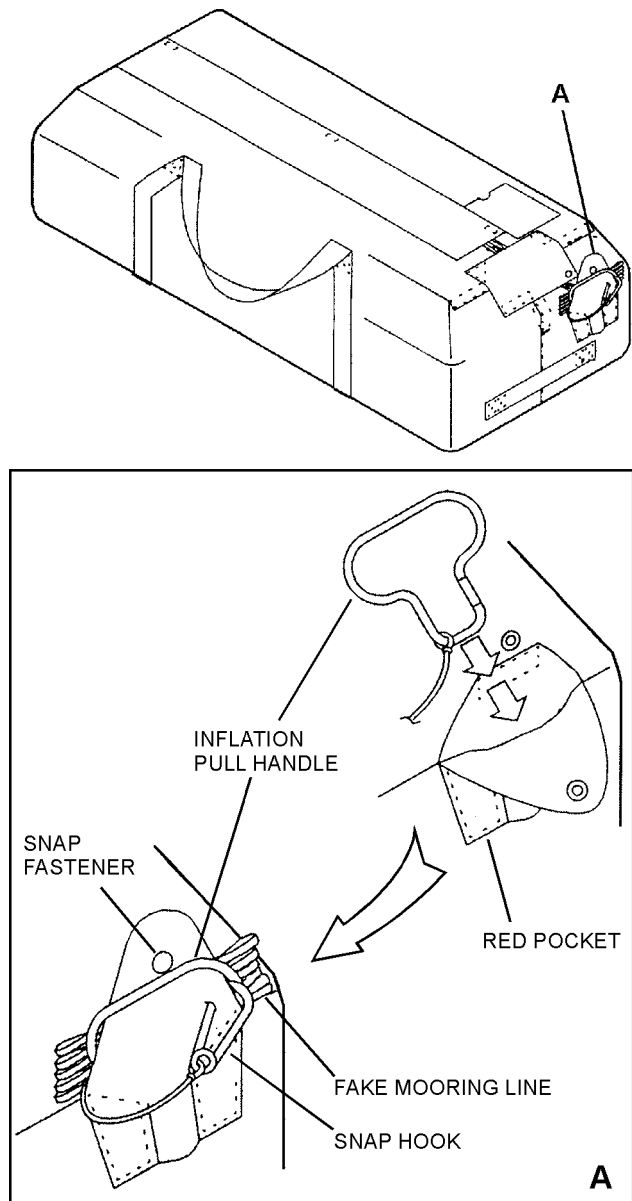
6. Insert the ripcord pin between the top of the short loop and the daisy chain loop. Using "E" thread, safety tie the ripcord pin using a clove hitch, half hitches and square knot. Inspect for proper closure of daisy chain and placement of ripcord pin.



Steps 5 and 6 - Para 13-29

13p29s5

7. Place inflation pull handle in red pocket, carefully fake actuation/mooring line using six-inch width behind inflation pull handle, close and snap ripcord keeper flap. Engage mooring snap-hook on front of keeper flap. Close remaining protective covers and secure snaps and hook and pile fasteners.



Step 7 - Para 13-29

13p29s7

8. Make necessary entries on appropriate form(s) in accordance with the OPNAVINST 4790.2 series.

13-30. REMOVING AND REPACKING LIFERAFT ENCLOSURE ASSEMBLY. To remove and repack liferaft enclosure assembly from carrying case to facilitate repairs or cleaning, proceed as follows:

13-31. Removing Liferaft Enclosure Assembly.

1. Place liferaft assembly on clean flat surface.

CAUTION

Pulling on inflation pull handle or the attached actuation/mooring line will inflate liferaft

2. Open the carrying case by unsnapping the snaps and separating the hook and pile fastener closures on the protective flaps. Cut and remove the safety tie on the single ripcord pin, then remove the pin and unlace the daisy chain. Unsnap the red inflation pull handle keeper flap and place inflation pull handle, actuation/mooring line, and mooring snap hook next to carrying case.

3. Locate the accessory container on top of the liferaft assembly. It has a white nylon retaining line tied to the handles. This retaining line is attached to the liferaft, and enters the tub opposite end of the mooring/actuation line. Remove the accessory container and place it next to the liferaft assembly.

4. Untie and remove the white nylon retaining line from the accessory container handles.

5. Lift liferaft enclosure assembly from carrying case by working hand between carrying case and enclosure assembly so that the enclosure assembly tub can be lifted. Hold carrying case down while pulling upward on enclosure assembly until removed from carrying case.

6. Reposition cover on enclosure assembly tub if it was displaced during removal.

7. Perform required maintenance.

13-32. Repacking Liferaft Enclosure Assembly.

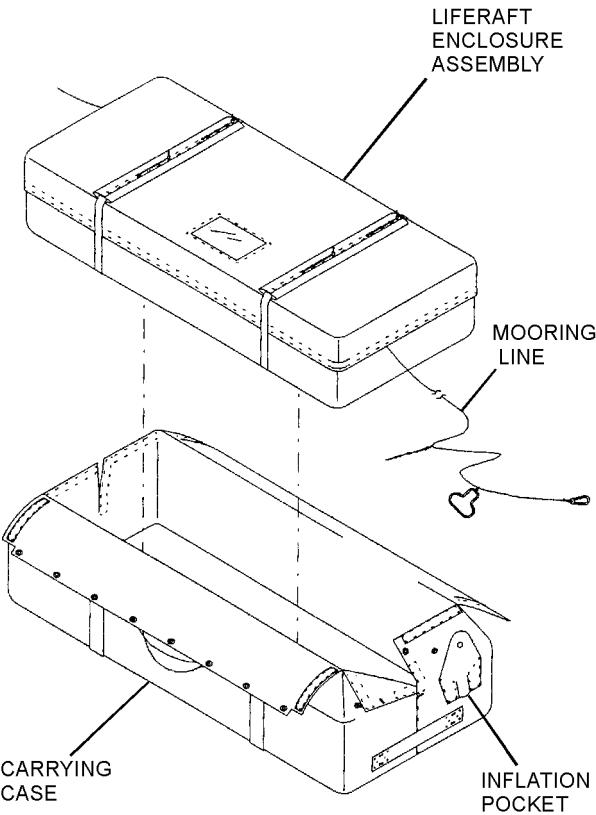
1. Ensure the bottom of the carrying case is free of FOD and sharp objects.



Pulling on inflation pull handle or the attached actuation/mooring line will inflate liferaft

2. Position carrying case and enclosure assembly so the actuation/mooring line will exit the carrying case at the inflation pull end when the enclosure assembly is placed in the carrying case.

3. Place the liferaft enclosure assembly in the carrying case. Check to ensure the cover assembly was not displaced while putting the enclosure assembly in the carrying case. Check for proper routing of actuation/mooring line and accessory container retaining line.



Steps 2 and 3 - Para 13-32

13p32s2

4. Inspect liferaft in accordance with paragraph 13-23.

13-33. CLEANING AND SERVICING.

13-34. CLEANING THE LRU-30A/A, LRU-31A/A, OR LRU-32A/A. To clean liferaft, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint Free, Type II	MIL-C-85043 NIIN 01-044-9281



Solvents are not to be used in cleaning the liferaft. Use extreme care when cleaning around the area surrounding inflation valve and cable guide.

1. Dab or blot excess oil, fluid or dirt off of area being cleaned. Do not rub into material.
2. Prepare solution of detergent consisting of 1/4 to 1/2 ounce of detergent per gallon of water.
3. Clean affected area with lint free cloth or sponge.
4. Dry with lint free cloth.

13-35. REPAIR/REPLACEMENT.

13-36. Repair of the LRU-30A/A, LRU-31A/A, or LRU-32A/A is limited to the carrying case and accessory container. No attempt shall be made to repair the liferaft. Repair of the carrying case and accessory container are limited to replacing loose or broken stitching, and repair of minor cuts using standard shop repair practices. All repairs shall be documented by making necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series. If the liferaft requires repair, it must be returned to the vendor. If the damage was not caused by neglect or abuse, submit an NAMDRP report in accordance with the OPNAVINST 4790.2 Series.

Section 13-4. Illustrated Parts Breakdown

13-37. GENERAL.

13-38. This section lists and illustrates the assemblies and parts of the LRU-30A/A, LRU-31A/A, and LRU-32A/A liferafts.

13-39. The illustrated parts breakdown should be used during maintenance when requisitioning and identifying parts.

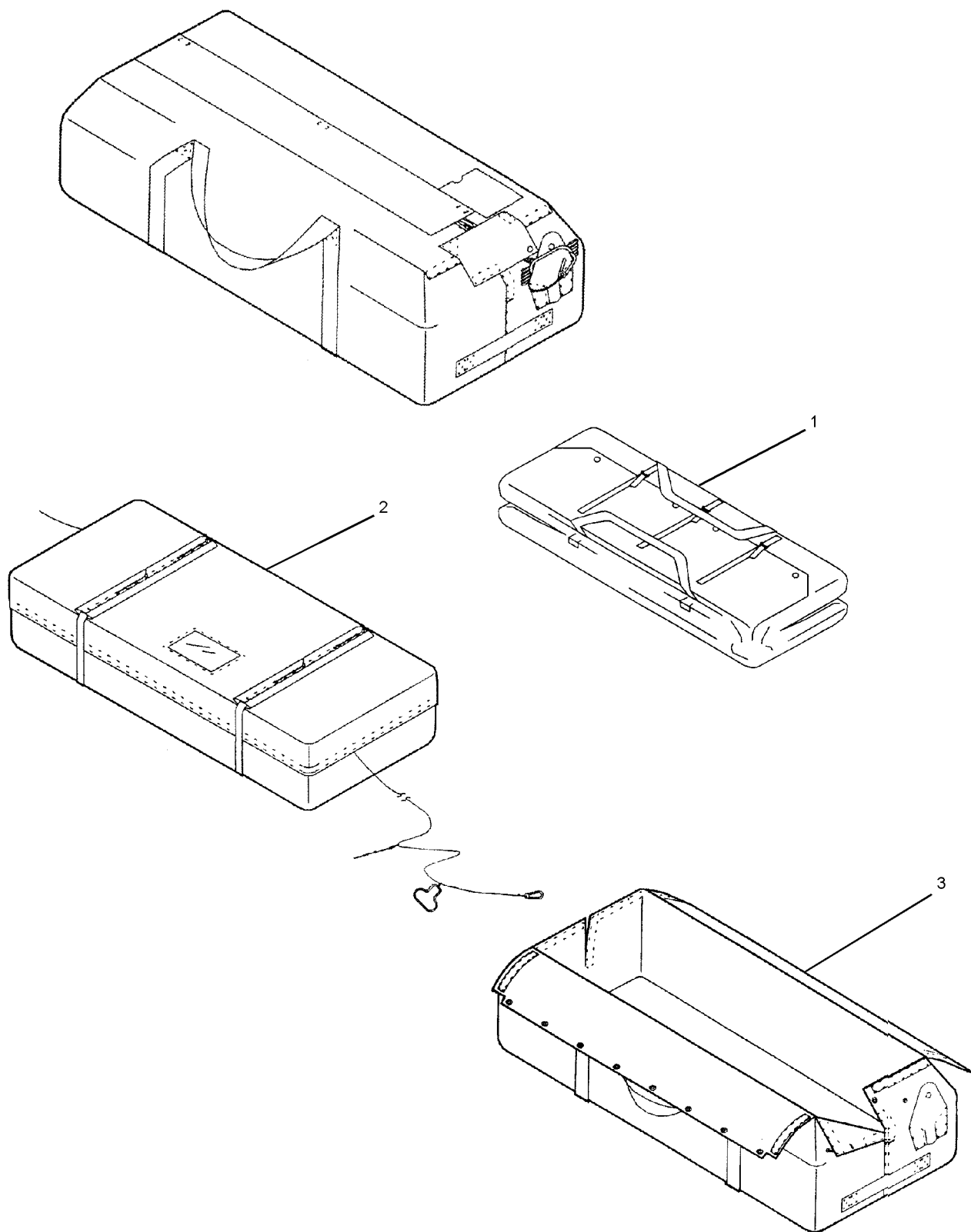


Figure 13-2. Multi-Place Liferaft (MPLR), LRU-30A/A, LRU-31A/A, and LRU-32A/A

013002

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-2	64490-103	LIFERAFT ASSEMBLY LRU-30A/A (Note 2) [] [] [] []	REF	A
	64500-103	LIFERAFT ASSEMBLY LRU-31A/A (Note 2) [] [] [] []	REF	B
	64510-103	LIFERAFT ASSEMBLY LRU-32A/A (Note 2) [] [] [] []	REF	C
-1	64610-101	. SURVIVAL EQUIPMENT CONTAINER LRU-30A/A	1	A
	64611-101	. SURVIVAL EQUIPMENT CONTAINER LRU-31A/A	1	B
	64612-101	. SURVIVAL EQUIPMENT CONTAINER LRU-32A/A	1	C
-2	65770-101	. LIFERAFT AND ENCLOSURE ASSEMBLY ... (Polymer Tub) LRU-30A/A	1	A
	65637-101	. LIFERAFT AND ENCLOSURE ASSEMBLY ... (Polymer Tub) LRU-31A/A	1	B
	65793-101	. LIFERAFT AND ENCLOSURE ASSEMBLY ... (Polymer Tub) LRU-32A/A	1	C
-3	65774-101	. CARRYING CASE, Liferaft LRU-30A/A LRU-30A/A	1	A
	65611-101	. CARRYING CASE, Liferaft LRU-31A/A LRU-31A/A	1	B
	65794-101	. CARRYING CASE, Liferaft LRU-32A/A LRU-32A/A	1	C
	-	FIVE YEAR OVERHAUL, Repack (Note 2) [] [] [] [] (NSN XXXXXXXXXXXXXXX)	REF	
Notes: 1. Assembly includes Liferaft, Carrying Case, and Survival Equipment Container. Survival equipment must be ordered separately. 2. Order Five-Year Vendor Overhaul/Repack on VIDS/MAF OPNAVFORM 4790/66.				

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
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64490-103	13-2	
64500-103	13-2	
64510-103	13-2	
64610-101	13-2-1	
64611-101	13-2-1	
64612-101	13-2-1	

Part Number	Figure and Index Number	SM&R Code
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65611-101	13-2-3	
65637-101	13-2-2	
65770-101	13-2-2	
65774-101	13-2-3	
65793-101	13-2-2	
65794-101	13-2-3	

CHAPTER 14

MULTI-PLACE LIFERAFT (MPLR), LRU-33/A (20-MAN)

(C-130J WING CONFIGURATION ONLY)

Section 14-1. Description

14-1. GENERAL.

14-2. The MPLR are multi-place liferafts intended for use by aircrewmembers and passengers forced down at sea. The liferafts come in three sizes: 8-man, 12-man, and 20-man. The only MPLR authorized for C-130J wing installation is the LRU-33/A (20-man). The Air Cruisers 46-man, P/N 63880-103/104, is also authorized for use. Other MPLR: LRU-30A/A (8-man), LRU-31A/A (12-man), and the LRU-32A/A (20-man) may be stowed in the fuselage of the C-130J if required. The MPLR are replacement liferafts for the older LRU-13/14/15 series liferafts.

14-3. CONFIGURATION.

14-4. The LRU-33/A 20-Man Liferaft System (figure 14-1) consists of a dual tube non-reversible raft with a self-erecting canopy, an accessory container and liferaft carrying case. A foam block with cable guides and cables for left and right wing installation are also provided. Two retaining straps with frangible links, which break when the liferaft is actuated, help maintain the form of the folded liferaft. The liferaft is constructed of urethane-coated nylon with thermo-bonded seams. The liferaft design incorporates a self-erecting canopy, an inflation system with a non-shatterable gas cylinder, an insulated floor, self-inflating boarding ramps, and two water-activated lights (one inside and one outside). Other features include attached ballast bags, sea anchor, and rain water collector.

14-5. The accessory container does not include survival items when received from the manufacturer. Survival items will be placed in the container during the Place-In-Service Inspection. The accessory container is not folded inside the raft, it is placed on top of the raft in the carrying case (figure 14-2). The accessory container is secured to the liferaft using a

white nylon retaining line. The accessory container must be pulled into the liferaft after boarding.

14-6. The liferaft carrying case is constructed using urethane coated nylon cloth. With the liferaft and accessory container installed, the carrying case is held securely closed with hook and pile fasteners and a series of snap fasteners. There are three foam blocks installed in the bottom of the carrying case to prevent excess movement of the liferaft and the actuation valve assembly. The outside of the carrying case has four D-rings for use in hoisting the liferaft. There is also a pocket for the manufacturer's maintenance record, which must be kept with the liferaft. This card is only used by the vendor and must be returned with the raft for maintenance.

14-7. APPLICATION.

14-8. The LRU-33/A is only authorized for use in C-130J wing stowage compartment.

14-9. FUNCTION.

NOTE

Instructions for installing the LRU-33/A into C-130J wing compartments are located in the applicable aircraft MIMS.

14-10. The LRU-33/A is inflated by pulling on one of the actuation handles at one of the aircraft flight stations. The handle is attached to the aircraft cable, which is connected to the fairlead assembly in the wing. The opposite end of the fairlead is attached to the liferaft actuation cable. This actuation cable is routed through the cable guide in the foam block assembly mounted in the cylinder cradle. After passing through the cable guide it is attached to the valve assembly via a quick disconnect link.

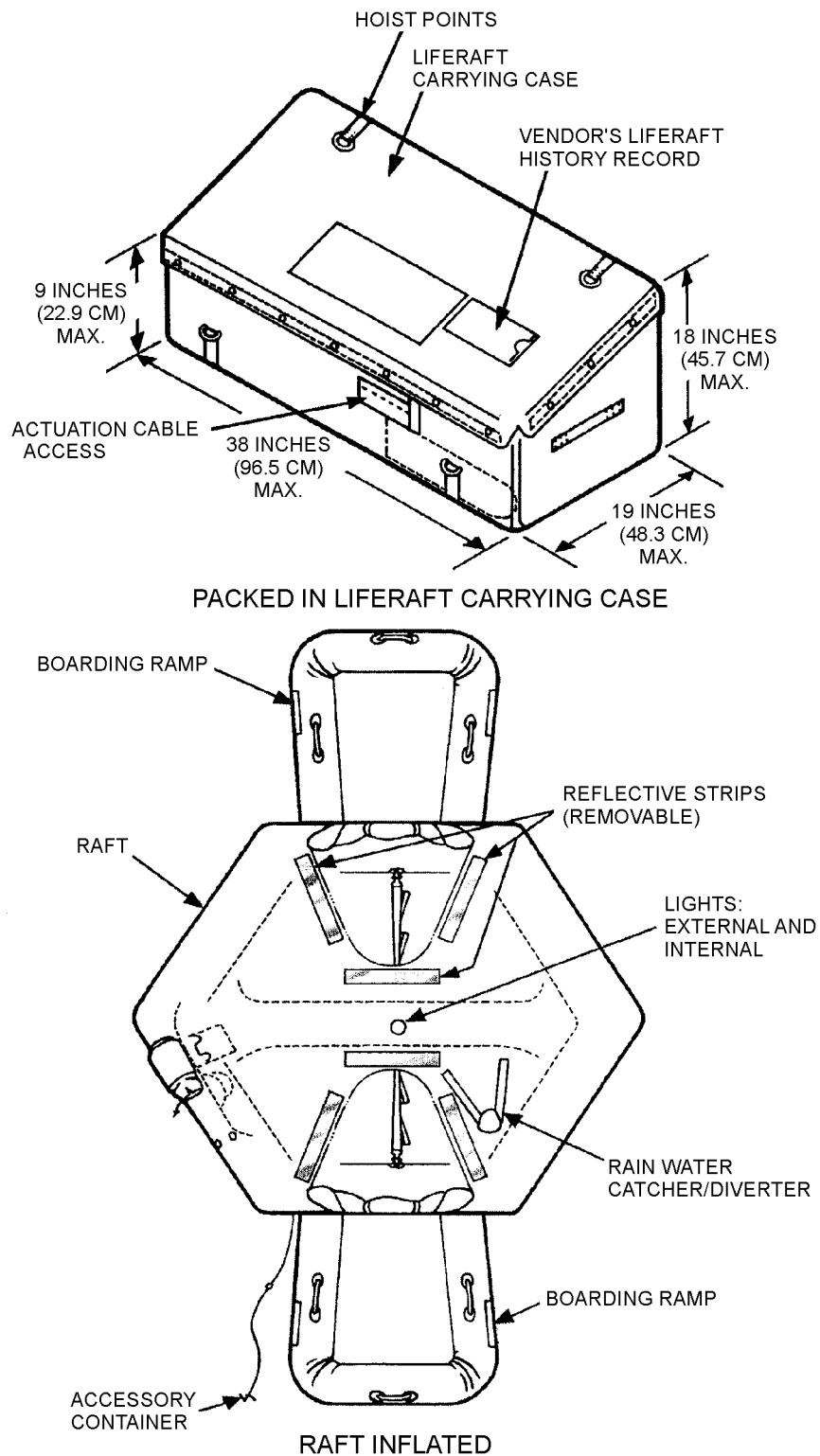


Figure 14-1. LRU-33/A Liferaft

014001

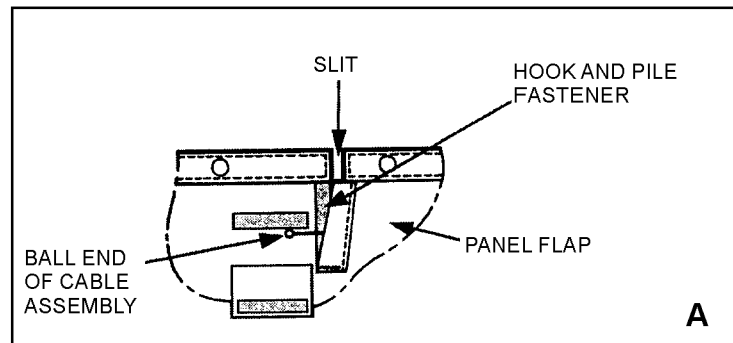
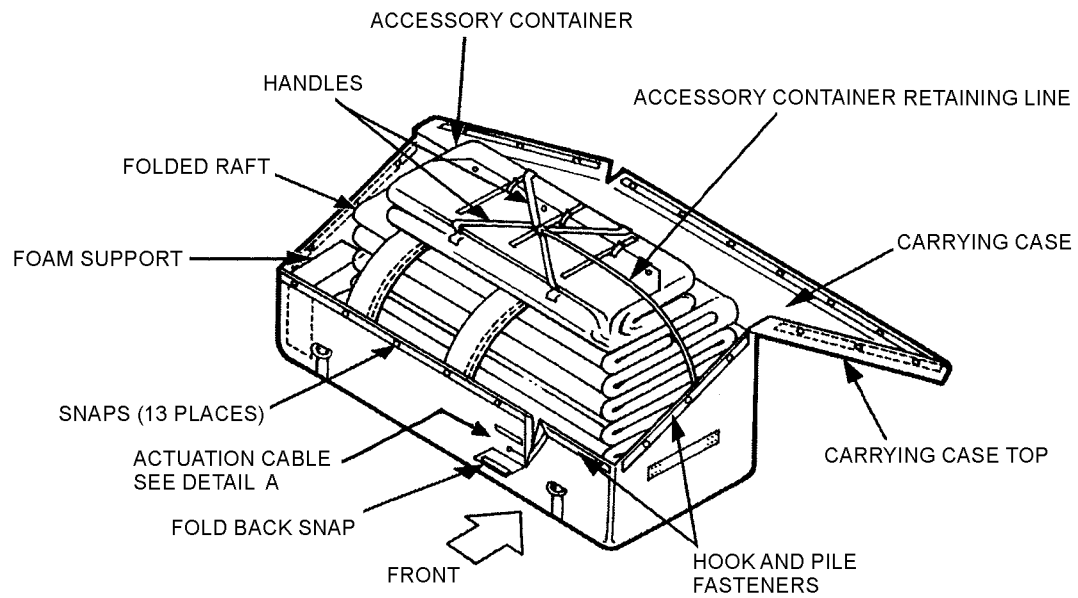


Figure 14-2. LRU-33/A Packed in Liferaft Carrying Case

014002

Section 14-2. Modifications

14-11. GENERAL.

14-12. There are no authorized modifications to the LRU-33/A at this time.

Section 14-3. Maintenance

14-13. GENERAL.

14-14. This section contains information on inspection, packing, cleaning, and repair/replacement of the LRU-33/A.

14-15. INSPECTION.

14-16. All LRU-33/A assemblies shall be subjected to Place-In-Service, Daily/Pre-Flight, Isochronal Scheduled Inspection System (ISIS), Acceptance, and Three-Year Vendor Repack Inspections.

14-17. The Place-In-Service Inspection shall be performed on all new assemblies or assemblies being returned from vendor repair or repack. The Aircraft Intermediate Maintenance Department shall perform this inspection.

14-18. The Daily/Pre-flight shall be performed prior to the first flight of the day. For wing installed liferafts this inspection shall be performed in accordance with applicable aircraft MIMS.

NOTE

The inspection cycle of the LRU-33/A is limited by the installed survival equipment. The inspection cycle may be adjusted, however it shall not exceed the service life of the installed radio batteries or 448 days which ever occurs first.

14-19. The ISIS inspection shall be performed at the AIMD. The interval for the LRU-33/A shall not exceed 448 days and in no case shall the cycle go beyond the service life of the installed radio batteries.

14-20. The Acceptance Inspection shall be performed in accordance with applicable MIMS and as directed during aircraft transfer.

14-21. Three Year Vendor Repack Inspection shall be performed every three years. The AIMD and designated vendor perform this inspection.

14-22. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentmen shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

14-23. PLACE-IN-SERVICE INSPECTION. To perform the Place-In-Service Inspection, proceed as follows:



The actuation cable for the LRU-33/A is not secured during shipment/transport. Use care when handling the carrying case. Locate the actuation cable (figure 14-2) prior to handling to prevent inadvertent actuation.

1. Carefully remove liferaft from shipping container, ensure the actuation cable is not pulled. Place the liferaft on a clean, flat surface. Save the shipping container, if possible, for future use. Should the liferaft have to be returned for warranty repairs or three-year repack, the original container provides excellent form fit protection.

2. Inspect the outer carrying case and attached hardware for wear, cuts, tears, attachment and defects.

3. Open the carrying case by unsnapping the snaps and separating the hook and pile closures.

4. Locate the accessory container on top of the liferaft assembly. It has a white nylon retaining line. Set the accessory container on the flat surface next to the liferaft assembly.

5. Locate the yellow mooring line near the valve end of the carbon dioxide cylinder. Verify that it is not wrapped around the inflation cable guide tube at the valve end of the carbon dioxide cylinder. The organizational level will secure this line to the aircraft when the raft is installed in the wing bucket.

6. Verify the charge in the carbon dioxide cylinder by checking the sight gage located on the valve. The indicator should be in the green. If the indicator is in the red on the gage, submit a QDR in accordance with OPNAVINST 4790.2 Series.

7. Untie and remove the white nylon retaining line from the accessory container. Obtain the required survival items listed in [table 14-1](#) and inspect items in accordance with [paragraph 14-28](#). Pack items in the accessory container in accordance with [paragraph 14-30](#).

8. Verify the serial number of the raft against the manufacturer's maintenance record card located in the pocket found on the top of the carrying case. Ensure that the manufacturer's record remains with the raft at all times.

9. Locate the two liferaft retaining straps that encircle the raft ([figure 14-3](#)). The straps have urethane coated nylon covers secured with hook and pile fasteners, open the covers and inspect the frangible links. Close the covers by securing the hook and pile fasteners. If the frangible links are damaged or broken, submit a QDR in accordance with the OPNAVINST 4790.2 Series.

10. Pack accessory container and close carrying case in accordance with [paragraph 14-31](#). Use caution when handling case to ensure the liferaft inflation cable is not pulled.

14-24. DAILY/PRE-FLIGHT INSPECTION. The Daily/Pre-Flight Inspection on wing-installed rafts

shall be accomplished in accordance with applicable aircraft MIMS.

14-25. PHASE/ISIS INSPECTION. To perform a Phase/ISIS Inspection, proceed as follows:

CAUTION

The actuation cable for the LRU-33/A is not secured during shipment/transport. Use care when handling the liferaft and carrying case. Locate the actuation cable ([figure 14-2](#)) prior to handling to prevent inadvertent actuation.

NOTE

The inspection cycle of the LRU-33/A is limited by the installed survival equipment. The inspection cycle may be adjusted, however it shall not exceed the service life of the installed radio batteries or 448 days which ever occurs first.

1. Place liferaft assembly on clean flat surface. Open the carrying case by unsnapping snaps and separating hook and pile closures.

2. Locate accessory container on top of liferaft. Untie and remove the white nylon retaining line from the accessory container. Place accessory container on clean, flat surface. Inventory items contained in the accessory container using [table 14-1](#). Inspect the survival items contained in the accessory container in accordance with [paragraph 14-28](#). Pack items in accessory container in accordance with [paragraph 14-30](#).

CAUTION

The actuation cable for the LRU-33/A is not secured during shipment/transport. Use care when handling the liferaft and carrying case. Locate the actuation cable ([figure 14-2](#)) prior to handling to prevent inadvertent actuation.

3. Ensure the liferaft inflation cable is clear of the access flap on the front of the carrying case, then lift the raft out of the carrying case and place on a flat surface.

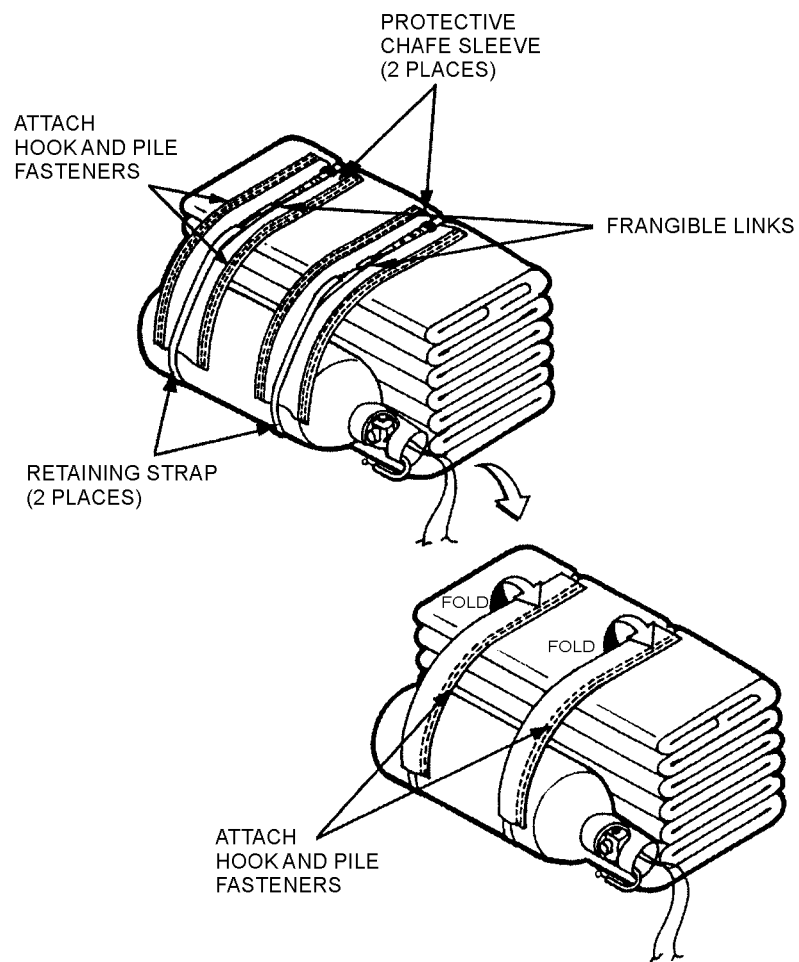


Figure 14-3. Liferaft Retaining Straps

014003

Table 14-1. LRU-33/A Survival Items

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Sea Dye Marker	8	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal MK-124 MOD 0 or Signal Kit, MK-189 MOD 0 (Not E3)	10 1	DL 313734 —	01-030-8330 L564-1370-01- 418-2657	— —
Water Storage Bag	7	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Not E7) w/ MROD w/o MROD	20 50	—	01-124-4543	PAOZZ
First Aid Kit	2	SC-C-6545-IL	00-922-1200	—
Desalinator, Manual Reverse Osmosis	1	—	01-313-6086	—
Sunburn Preventative Preparation	3	MIL-S-37800	01-121-2336	PAOZZ
Food Packet, Liferaft	20	MIL-F-15281	01-028-9406	PAOZZ
Bailing Sponge	6	L-S-626	00-240-2555	PAOZZ
Combat Casualty Blanket Type I	3	MIL-B-36964	00-935-6665	PAOZZ
Hand Generated Flashlight A-9 (Not E2)	1	MIL-F-8209	00-283-9806	PAOZZ
Flare Gun MK-79 MOD 0 (Note 8)	2	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or SDU-39/N	1	MIL-L-38217	00-067-5209 00-411-8535	PAOZZ PAOZZ
Light, Chemical	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Not E3) or Signal Mirror, Type II	1	MIL-M-18371	00-105-1252 01-455-6695 01-455-6671	PAOZZ PAOZZ PAOZZ
Survival Radio (Notes 4 and 6) and/or Radio Beacon AN/URT-33A (Not E4)	1	MIL-B-38401	00-160-2136	PAOGG
Code Card (Not E3)	1	—	—	—
Whistle Type II	1	MIL-W-1053	00-254-8803	PAOZZ
Compass, Pocket, Type MC-1 (Note 1) or Compass, Wrist	1	MIL-C-17850 WCC-100	00-515-5637 00-809-5252	PAOZZ PAOZZ
Pocket Knife	1	MIL-K-818	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	MIL-C-5040	00-240-2154	PAOZZ

Table 14-1. LRU-33/A Survival Items (Cont)

Description	Quantity Required	Reference Number	NIIN	SM&R Code
<p>Notes:</p> <ol style="list-style-type: none">1. Use MIL-C-17850 until stock is depleted, then use WCC-100.2. Required for Arctic missions; optional otherwise.3. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted.4. Survival Radio or Radio Beacon requirements shall be in accordance with OPNAVINST 3710.7 Series. Following radios apply: Voice-Beacon: AN/PRC-90, AN/PRC-90-2, and AN/PRC-149, Beacon only: AN/URT-33, AN/PRT-5, and AN/PRC-140. The AN/PRC-149 will become the preferred radio when available.5. Refer to NAVAIR 13-1-6.5.6. Ensure battery service life does not expire prior to the next scheduled special inspection. Refer to applicable radio maintenance publication for battery service life.7. MROD shall be installed if available. MPLR is considered RFI without MROD provided bagged water is increased. MROD should not be used where water temperatures are below 36°F.8. MK-189 MOD 0 Signal Kit contains 6 MK-124 Day/Night flares and 2 MK-79 MOD 0 flare guns. If used, it fills flare requirements.				

4. Inspect carrying case for wear, cuts, tears, and security of attached hardware. Repairs are limited to minor stitching and patching of carrying case. See [paragraph 14-34](#) for authorized repairs.

5. Inspect carrying case for dirt/soot, and lubricants. To clean raft and carrying case, see [paragraph 14-33](#).

6. Verify the charge in the carbon dioxide cylinder by checking the sight gage located on the valve. The indicator should be in the green. If the indicator is in the red on the gage, submit NAMDRP report in accordance with OPNAVINST 4790.2 Series.

7. Inspect inflation valve for corrosion and defects. Inspect actuation cable routing “U-Tube” for kinks or bends.

8. Locate the two liferaft retaining straps that encircle the raft ([figure 14-3](#)). The straps have urethane-coated nylon covers secured with hook and pile fasteners. Open the covers and inspect the frangible links. Close the covers by securing the hook and pile fasteners. If the frangible links are damaged or broken, submit an NAMDRP report in accordance with the OPNAVINST 4790.2 Series.

9. Pack liferaft assembly and accessory container back in the carrying case in accordance with [paragraph 14-31](#). Use caution when handling to ensure the liferaft inflation cable is not pulled.

14-26. ACCEPTANCE INSPECTION. To perform an Acceptance Inspection, proceed as follows:

NOTE

Acceptance Inspections may consist of checking history records and performing a visual inspection of the raft. The raft may be inducted to AIMD for further inspection if directed.

1. Locate history records for raft assembly. Verify expiration dates for installed equipment.

2. Visually inspect raft assembly and verify serial numbers that are visible without opening raft. Ensure vendor’s liferaft history record is located in the pocket on top of the carrying case.

3. If directed or if record and visual inspections detect errors, induct raft to AIMD for Phase/ISIS level inspection.

14-27. THREE-YEAR VENDOR REPACK INSPECTION. To perform a Three-Year Vendor Repack Inspection, proceed as follows:



The actuation cable for the LRU-33/A is not secured during shipment/transport. Use care when handling the carrying case. Locate the actuation cable (figure 14-1) prior to handling to prevent inadvertent actuation.

1. Organizational:

a. Remove the liferaft assembly from the aircraft in accordance with applicable aircraft MIMS and induct to the AIMD for processing.

2. AIMD:

a. Place liferaft on clean flat surface. Open container by unsnapping snaps and separating hook and pile fasteners.

b. Locate and remove accessory container. Remove retaining line from accessory container handles by untying bowline knot. Inspect survival items in accordance with paragraph 14-28.

c. Verify liferaft serial number against vendor's maintenance record card located in pocket on carrying case.

d. Close carrying case and secure snaps and hook and pile fasteners. Place liferaft in shipping container. Preferred container is type used by vendor for shipping. If no vendor type shipping containers are available, package liferaft to ensure that no damage will occur in shipping. If liferaft is damaged in shipping, vendor will add repair charges to repack inspection.

e. Order vendor repack on VIDS MAF using stock number provided in Illustrated Parts Breakdown.

f. AIMD shall issue spare raft from ALSS pool while liferaft undergoes repack inspection.

g. Liferafts returned from Vendor Repack Inspection shall receive a Place-In-Service Inspection prior to re-issue.

14-28. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

Refer to NAVAIR 13-1-6.5 for information on inspection/replacement and modification of survival items.

With exception of batteries, items reaching over-age while packed in survival kits and liferafts shall remain in service until the next inspection cycle of the completed assembly.

1. Inventory all accessory and survival items by checking items against table 14-1. Replace missing or unsatisfactory items.

NOTE

Ensure radio battery service life does not expire prior to the next scheduled calendar inspection. Refer to applicable radio maintenance publication for battery service life. Batteries which do not meet service life requirements must not be utilized and must be turned into supply for disposal via local instructions.

2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.

3. Operate all items which are not expended in use. Replace as necessary.

14-29. PACKING.

14-30. PACKING OF SURVIVAL ITEMS IN ACCESSORY CONTAINER. The survival items shall be packed into the accessory container at the Place-In-Service Inspection or after removal for Phase/ISIS Inspection by the intermediate level of maintenance. The procedures shall be as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cord, Nylon, Type III	NIIN 00-240-2146
As Required	Wrap, Cushioning	NIIN 00-142-9008
As Required	Tape, Pressure Sensitive	NIIN 00-266-5016

1. Inventory survival items. Refer to table 14-1 for items used and quantity.

NOTE

NAVAIR 13-1-6.5 contains information on inspection/replacement and modifications to survival items.

2. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap and secure with rubber bands.

3. Stow accessories and survival items in accessory container. Pack items evenly to keep the container as flat as possible.

4. Tie MROD (if used) and radios to accessory container tie down loops with 48-inch length of Type III nylon cord, using a bowline knot.

5. Secure latches on first aid kit with several layers of pressure sensitive tape. Using an eight-foot length of Type III nylon cord tie an overhand knot in both ends. Wrap one end of cord two turns twice around the first aid kit, on the inside of the latches and tie with a surgeon's knot. Route opposite end of cord to accessory container tie down loop and secure with a bowline knot. Stow first aid kit in accessory container.

14-31. PACKING CARRYING CASE. To pack life-raft and accessory container in carrying case, proceed as follows:

- 1. Place carrying case on a clean, flat surface, oriented so the end with two foam blocks is on the right as you face the carrying case.
- 2. Ensure the bottom of the carrying case is free of FOD and sharp objects.



Locate the end of the actuation cable on the liferaft prior to moving to ensure it is not inadvertently pulled. The actuation cable exits the liferaft at the U-Tube cable guide.

3. Place the liferaft assembly in the carrying case (figure 14-4). Ensure the inflation valve is placed between the two foam blocks on the right. The end of the carbon dioxide cylinder should be resting against the single foam block at the opposite end of the carrying case.

4. Route the mooring line (yellow) behind cable guide and position on the right side of the carrying

case. Ensure the mooring line (yellow) is not wrapped around the U-Tube cable guide.

5. Tie the white nylon retaining line to the handles of the accessory container using a bowline knot. Secure around the center handles of the accessory container. Tack bowline knot with size "E" thread, one turn, secure with a surgeon's and a square knot.

6. Place the accessory container on top of raft assembly and stow the retaining line by faking line at end of the container by the carbon dioxide cylinder inflation valve. Ensure the accessory line is not directly on top of the yellow mooring line or wrapped around the U-Tube cable guide.

7. Close the carrying case by securing hook and pile fasteners and snaps. Ensure the actuation cable is routed through the actuation cable access flap located on the front of the carrying case (figure 14-5).

8. Make necessary entries on appropriate form(s) in accordance with the OPNAVINST 4790.2 series.

14-32. CLEANING AND SERVICING.

14-33. CLEANING OF LRU-33/A. To clean the LRU-33/A, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint Free, Type II	MIL-C-85043 NIIN 00-044-9281



Solvents are not to be used in cleaning the LRU-33/A liferaft. Use extreme care when cleaning around the area surrounding inflation valve and cable guide.

- 1. Dab or blot excess oil, fluid or dirt off of area being cleaned. Do not rub into material.
- 2. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.
- 3. Clean affected area with lint-free cloth or sponge.
- 4. Dry with lint-free cloth.

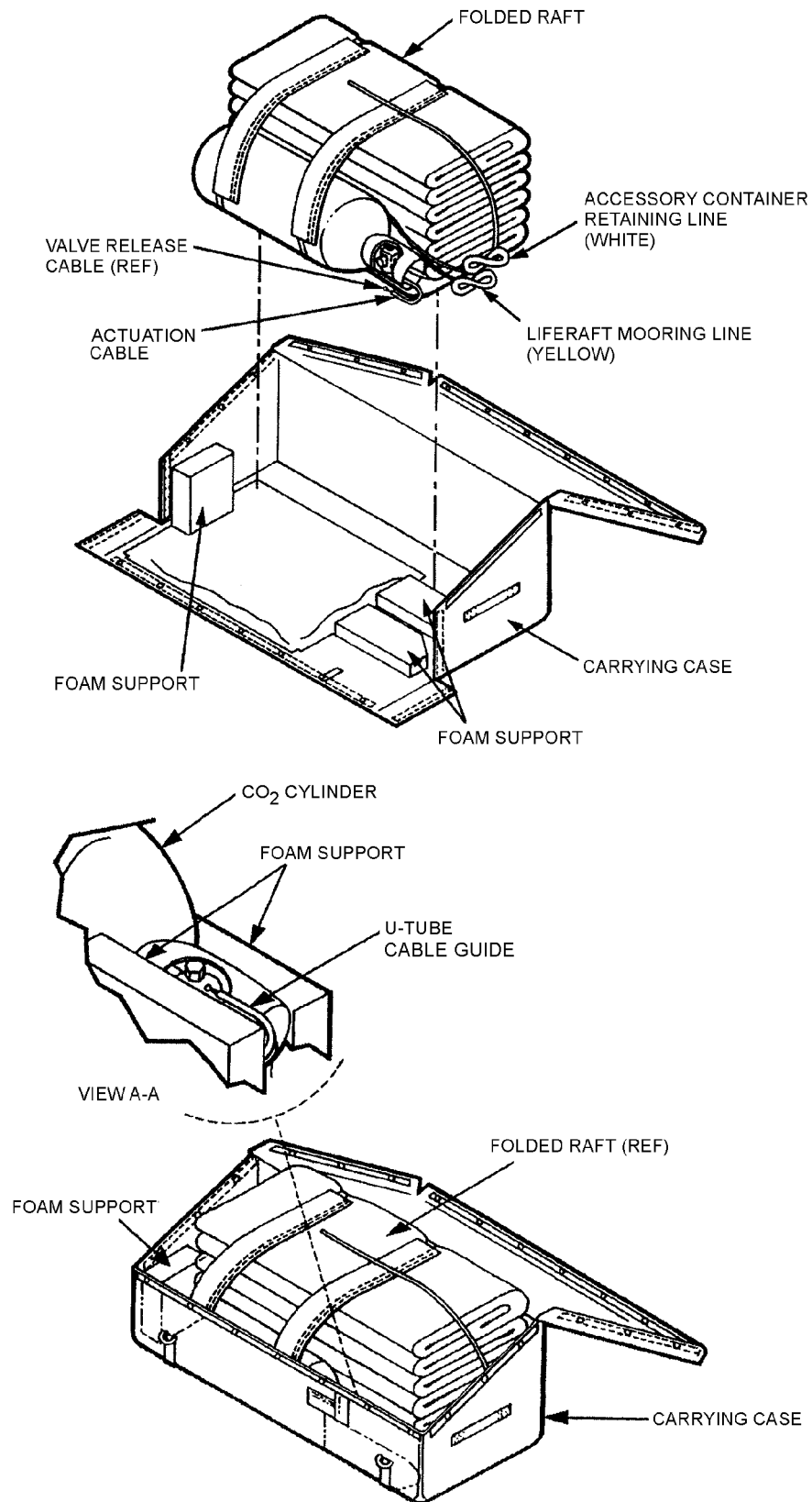


Figure 14-4. Packing Liferaft Assembly in Carrying Case

014004

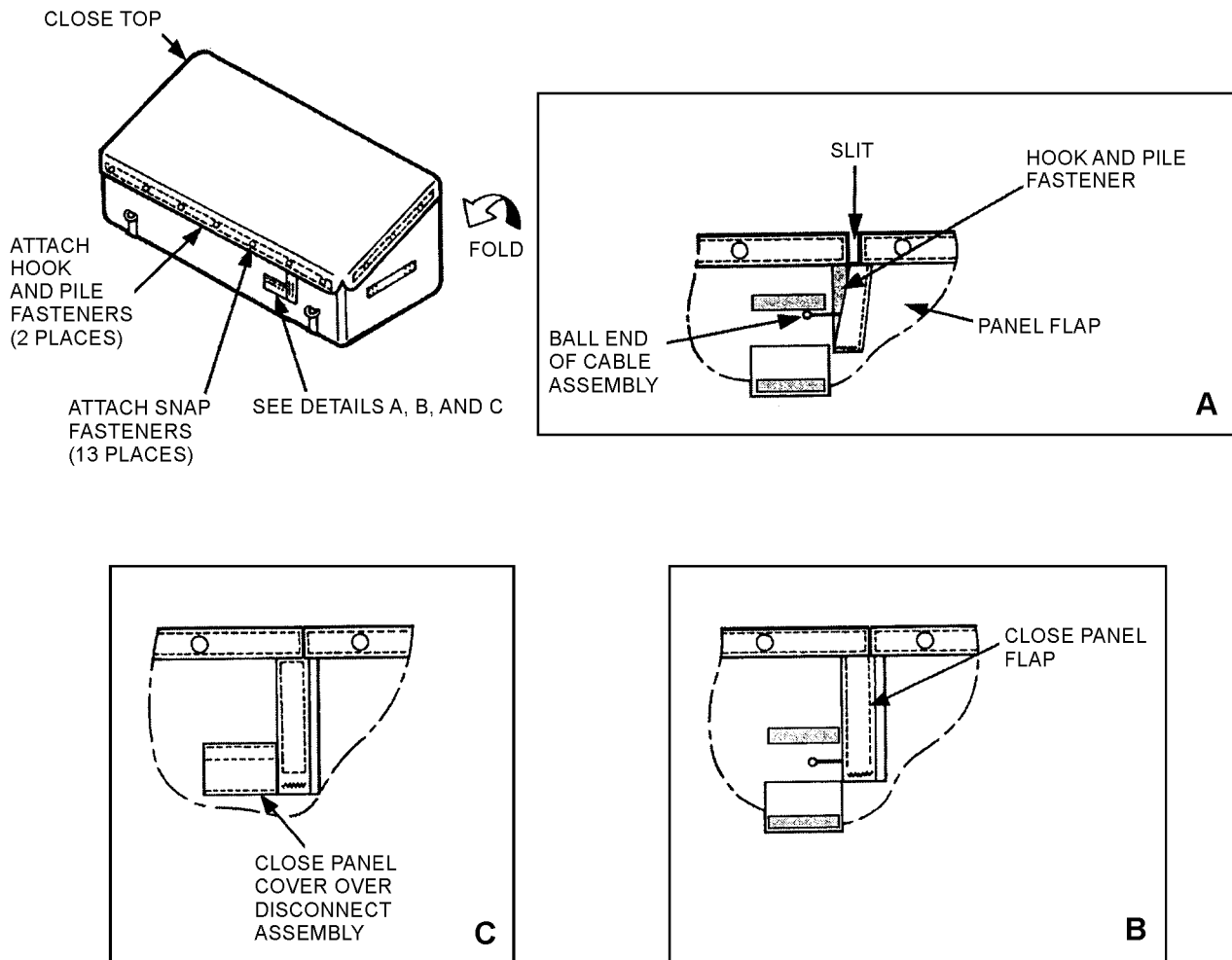


Figure 14-5. Closing the Liferaft Carrying Case

014005

14-34. REPAIR/REPLACEMENT.

14-35. Repair of the LRU-33/A is limited to the carrying case and accessory container. No attempt shall be made to repair the liferaft. Repair of the carrying case and accessory container are limited to replacing loose or broken stitching, and repair of minor cuts

using standard shop repair practices. All repairs shall be documented by making necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series. If the liferaft requires repair, it must be returned to the vendor. If the damage was not caused by neglect or abuse, submit an NAMDRP report in accordance with the OPNAVINST 4790.2 Series.

Section 14-4. Illustrated Parts Breakdown

14-36. GENERAL.

14-37. This section lists and illustrates the assemblies and parts of the LRU-33/A 20-Man Liferaft System (Wing Configuration).

14-38. The illustrated parts breakdown should be used during maintenance when requisitioning and identifying parts.

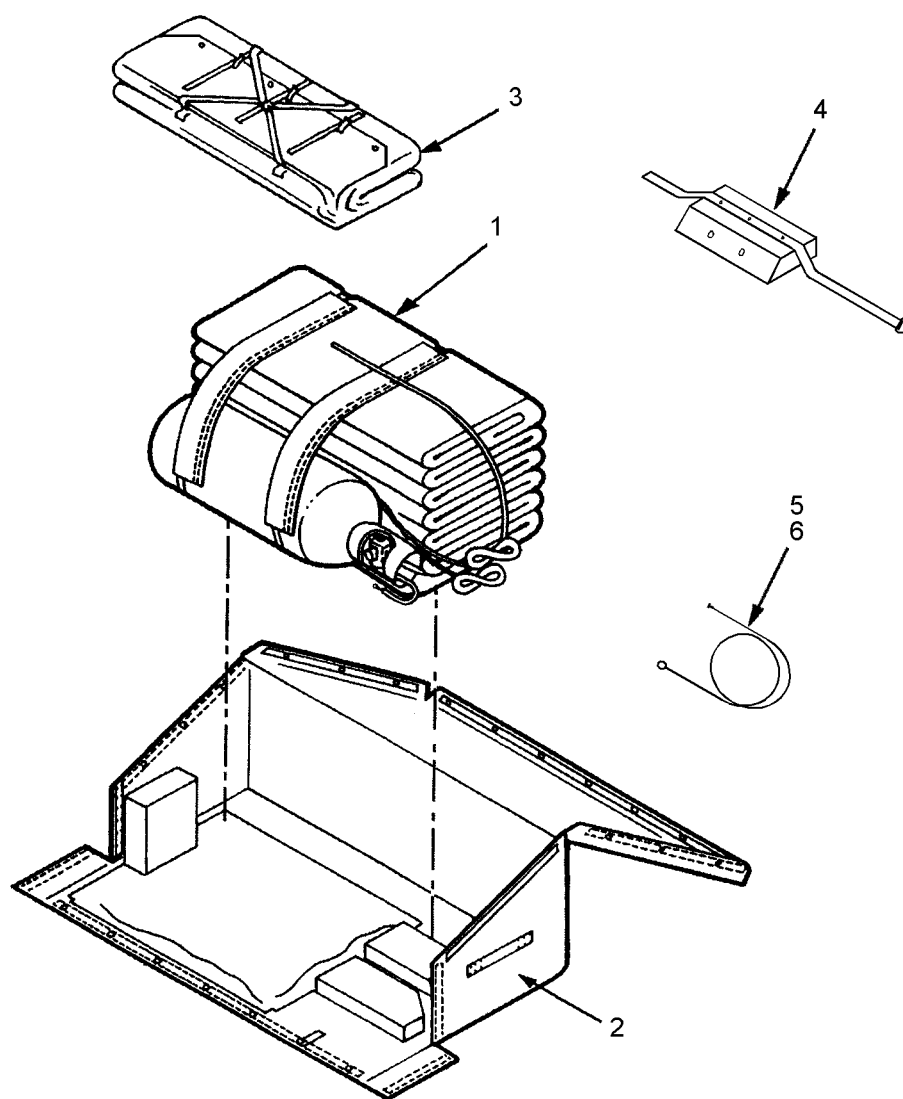


Figure 14-6. LRU-33/A 20-Man Liferaft System

014006

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
14-6	65260-103	LRU-33/A 20-MAN LIFERAFT ASSEMBLY (Not E1)	REF	
-1	65134-101	. LIFERAFT, 20-Man, Inflatable	1	
-2	65129-101	. CARRYING CASE, 20-Man	1	
-3	65130-101	. ACCESSORY CONTAINER, C-130	1	
-4	65246-101	BLOCK, Foam, C-130J (Not E2)	2	
-5	65267-101	. CABLE ASSEMBLY, Left (Red) (Note 3)	1	
-6	65267-102	. CABLE ASSEMBLY, Right (Green) (Not E3)	1	
	—	Three Year Vendor Repack (NSN to be provided) (Not E4)	—	
Notes: 1. Assembly includes Liferaft, Carrying Case, and Accessory Bag. Foam Blocks and cable assemblies must be ordered separately. 2. Foam block assembly comes with 1 left and 1 right wing cable. 3. Cable assemblies do not include foam block. 4. Order Three Year Vendor Repack on VIDS/MAF OPNAVFORM 4790/66.				

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65130-101	14-6-3	
65134-101	14-6-1	
65246-101	14-6-4	

Part Number	Figure and Index Number	SM&R Code
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65247-101	14-6-4	
65260-103	14-6	
65267-101	14-6-5	
65267-102	14-6-6	

CHAPTER 15

MULTI-PLACE LIFERAFT (MPLR), LRU-34/A (20-MAN)

(V-22 LIFERAFT SYSTEM)

Section 15-1. Description

15-1. GENERAL.

15-2. The MPLR are multi-place liferafts intended for use by aircrewmembers and passengers forced down at sea. The liferafts come in three sizes: 8-man, 12-man, and 20-man. MPLR have a 50 percent over-capacity rating, the LRU-34/A has survival provisions for 28 persons; thereby allowing it to be used at its maximum capacity. The MPLR are replacement liferafts for the older LRU-13/14/15 series liferafts.

15-3. CONFIGURATION.

15-4. The LRU-34/A 20-Man V-22 Liferaft System (figure 15-1) consists of a dual tube non-reversible liferaft with a self-erecting canopy, an accessory container and liferaft carrying case. A foam block with cable guides and cables for left and right wing installation are also provided. Two retaining straps with frangible links, which break when the liferaft is actuated help maintain the form of the folded liferaft. The liferaft is constructed of urethane-coated nylon with thermo-bonded seams. The liferaft design incorporates a self-erecting canopy, an inflation system with a non-shatterable gas cylinder, an insulated floor, self-inflating boarding ramps, and two water-activated lights (one inside and one outside). Other features include attached ballast bags, sea anchor, and rain water collector.

15-5. The accessory container does not include survival items when received from the manufacturer. Survival items will be placed in the container during the Place-In-Service Inspection. The accessory container is not folded inside the liferaft, it is placed on top of the raft in the carrying case. The accessory container is secured to the liferaft using a white nylon retaining line. The accessory container must be pulled into the liferaft after boarding.

15-6. The liferaft carrying case consists of three parts; the outer container is constructed using urethane coated nylon cloth. The liferaft is placed in a polymer tub and a polymer cover is placed over the tub and secured with frangible links. This clam-shell

type assembly separates during the inflation process. The actuation/mooring line and the survival equipment container tether line pass through rubber grommets in the polymer tub and cover, which pull free during the inflation process. With the liferaft and accessory container installed, the carrying case is held securely closed with a daisy chain opening system secured on the ripcord end by a single ripcord pin. There is also a pocket for the manufacturer's maintenance record, which must be kept with the liferaft, this card is only used by the vendor and must be returned with the raft during maintenance.

15-7. APPLICATION.

15-8. The LRU-34/A MPLR is only authorized for use in V-22 aircraft.

15-9. FUNCTION.

NOTE

Instructions for installing the LRU-34/A into the V-22 liferaft stowage compartment are located in the applicable aircraft MIMS.

15-10. The LRU-34/A is inflated by pulling on the liferaft ripcord handle located at the end of the liferaft container. The ripcord handle, actuation/mooring line and snap hook are stowed in a pocket with a red flap. To actuate, unsnap the flap holding the ripcord, locate the snap hook attached to the front of the red flap, the snap hook is secured to the bitter end of the liferaft actuation/mooring line and should be connected to the aircraft or a survivor prior to deployment. If attached to the aircraft, the retaining line will separate from the raft when the aircraft sinks. The sea anchor should be deployed as soon as possible to limit drifting from the area where the aircraft ditched. The survival equipment container retaining line should be located and the container should be hoisted into the liferaft immediately after all survivors are on board.

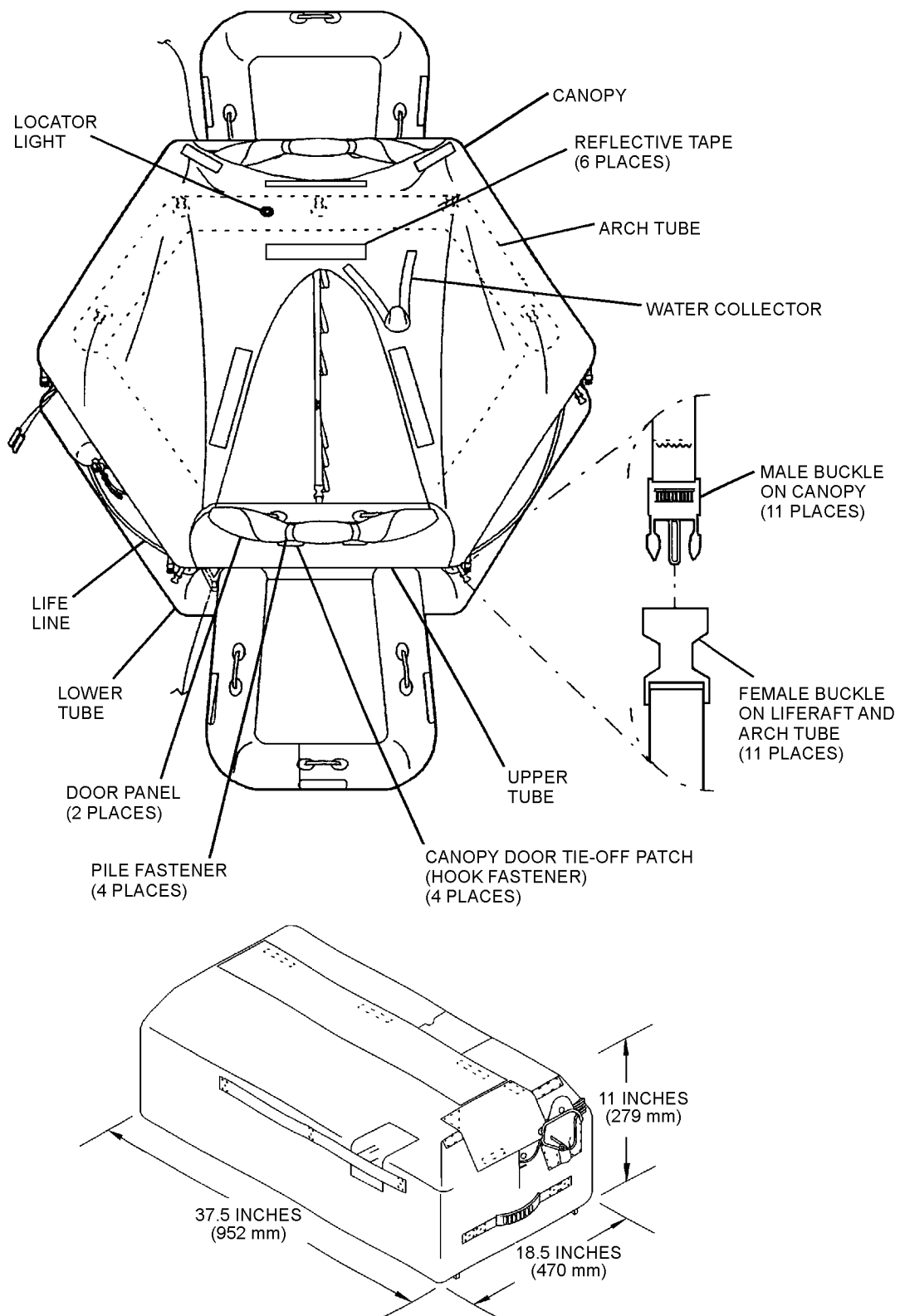


Figure 15-1. LRU-34/A Liferaft

015001

Section 15-2. Modifications

15-11. GENERAL.

15-12. There are no authorized modifications to the LRU-34/A at this time.

Section 15-3. Maintenance

15-13. GENERAL.

15-14. This section contains information on inspection, packing, and repair/replacement of the LRU-34/A.

15-15. INSPECTION.

15-16. All LRU-34/A assemblies shall be subjected to Place-In-Service, Daily/Preflight, 448-Day Inspection, Acceptance, and Five Year Vendor Repack Inspections.

15-17. The Place-In-Service Inspection shall be performed on all new assemblies or assemblies being returned from vendor repair or repack. The Aircraft Intermediate Maintenance Department shall perform this inspection.

15-18. The Daily/Preflight shall be performed on fuselage-installed liferafts prior to the first flight of the day. This inspection shall be performed by line personnel (plane captain or delegated aircrewmember) who have been designated, instructed and found qualified by the aviator's equipment branch.

NOTE

The inspection cycle of the LRU-34/A is limited by the installed survival equipment. The inspection cycle may be adjusted to match the aircraft inspection, however, it shall not exceed the service life of the installed radio batteries or 448 days, whichever occurs first.

15-19. The 448-Day Inspection shall be performed at the AIMD. The interval for the LRU-34/A shall not exceed 448 days; in no case shall the cycle go beyond the service life of the installed radio batteries.

15-20. Acceptance Inspection shall be performed in accordance with applicable MIMS and as directed during aircraft transfer.

15-21. Five Year Vendor Repack Inspection shall be performed every five years. The AIMD and designated vendor perform this inspection.

15-22. QUALITY ASSURANCE. The procedures detailed present a logical sequence for proper inspection. Quality assurance steps are provided for critical operations. When a step is underlined, the Aircrew Survival Equipmentmen shall perform the operation, then have performance verified by a Quality Assurance Representative (CDI, CDQAR, or QAR) prior to proceeding to the next operation. Work center supervisors are primarily responsible for quality assurance and in accordance with OPNAVINST 4790.2 Series may nominate experienced personnel in their work center to be screened and examined by the Quality Assurance Officer prior to their designation by the Commanding Officer as a Collateral Duty Inspector. In no case shall an Aircrew Survival Equipmentman perform his own quality assurance inspection. Procedures for quality assurance are listed following major operations.

15-23. PLACE-IN-SERVICE INSPECTION. To perform the Place-In-Service Inspection, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Thread, Nylon, Size E	V-T-295 NIIN 00-204-3884

1. Carefully remove liferaft from shipping container. Place the liferaft on a clean flat surface. Save the shipping container if possible, for future use. Should the liferaft have to be returned for warranty repairs or five-year repack the original container provides excellent form fit protection.

2. Inspect the outer carrying case and attached hardware for wear, cuts, tears, attachment and defects.



Pulling on ripcord handle or the attached actuation/mooring line will inflate liferaft.

3. Open the carrying case by unsnapping the snap and separating the hook and pile fasteners on the protective flaps. Cut and remove the safety tie on the single ripcord pin, then remove the pin and unlace the daisy chain. Unsnap the red ripcord keeper flap and place ripcord handle and actuation/mooring line next to carrying case.

4. Locate the accessory container on top of the liferaft assembly. It has a white nylon retaining line tied to the handles. This retaining line is attached to the liferaft, and enters the tub at the opposite end of the mooring/actuation line. Remove the accessory container.

5. Untie and remove the white nylon retaining line from the accessory container handles. Place the required survival items listed in [table 15-1](#) in the accessory container in accordance with [paragraph 15-30](#).

NOTE

Do not remove the frangible links or the cover for the polymer tub which the liferaft is stowed in.

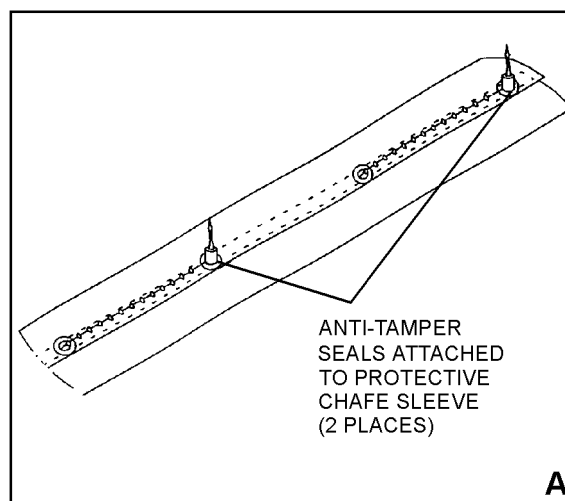
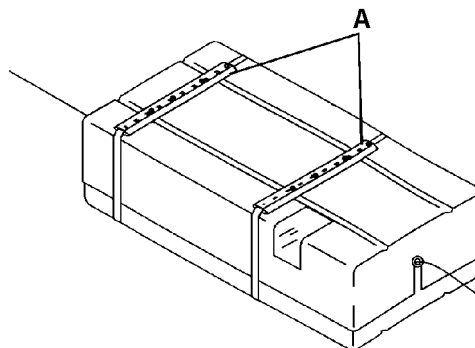
6. Verify the charge in the carbon dioxide cylinder by checking the sight gauge located on the inflation valve. The sight gauge is visible through the clear window located in the cover on the polymer tub. The indicator should be in the green. If the indicator is in the red on the gauge submit a QDR in accordance with OPNAVINST 4790.2 Series.

7. Verify the charge in the carbon dioxide cylinder by checking the sight gauge located on the valve. The indicator should be in the green. If the indicator is in the red on the gauge submit a QDR in accordance with OPNAVINST 4790.2 Series.

8. Verify the serial number of the liferaft against the manufacturer's maintenance record card located in the pocket found on the top of the carrying case. The serial number for the liferaft is found in two locations, on the polymer tub cover and the carrying case. Note that the manufacturer's record remains with the liferaft at all times.

9. Locate the two liferaft retaining straps that encircle the polymer tub. The straps have urethane coated nylon covers, which protect the frangible links. The covers are secured with hook and pile fasteners and two nylon anti-tamper seals routed through grommets. Inspect the integrity of the anti-tamper seals. If the anti-tamper seals are damaged or

broken, submit a QDR in accordance with the OPNAVINST 4790.2 Series.



Step 9 - Para 15-23

15p23s9

10. Pack carrying case in accordance with [paragraph 15-31](#).

15-24. DAILY/PREFLIGHT INSPECTION. To perform a Daily/Preflight Inspection, proceed as follows:

1. The Daily/Preflight Inspection on fuselage-installed liferafts shall be accomplished prior to the first flight of the day.

NOTE

Do not break any safety ties or remove ripcord during daily inspection.

2. Inspect carrying case for damage, cuts and attachment of hardware.

3. Open ripcord pin and daisy chain covers and inspect for integrity of ripcord pin safety tie and daisy chain lacing. Close ripcord pin and daisy chain covers, ensure snaps are snapped and hook and pile fasteners are engaged.

Table 15-1. MPLR Survival Items

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Sea Dye Marker	8	MIL-S-17980	00-270-9986	PAOZZ
Distress Signal, MK-124 MOD 0	10	DL 313734	01-030-8330	—
or Signal Kit, MK-189 MOD 0 (Note 1)	1	—	L564-1370-01-418-2657	—
Water Storage Bag	7	MIL-B-8571	00-485-3034	PAOZZ
Water, Drinking, Bagged, Emergency (Note 2)	70	—	01-124-4543	PAOZZ
First Aid Kit	2	SC-C-6545-IL	00-922-1200	—
Sunburn Preventative Preparation	3	MIL-S-37800	01-121-2336	PAOZZ
or Sunscreen and Insect Repellent (Sunscreen) (Note 3)	84	—	01-452-9582	—
Food Packet, Liferaft	28	MIL-F-15281	01-028-9406	PAOZZ
Bailing Sponge	6	L-S-626	00-240-2555	PAOZZ
Combat Casualty Blanket Type I	3	MIL-B-36964	00-935-6665	PAOZZ
Hand Generated Flashlight A-9 (Note 4)	1	MIL-F-8209	00-283-9806	PAOZZ
Flare Gun MK-79 MOD 0 (Note 5)	2	—	00-866-9788	PAOZZ
Signal Light (Strobe) SDU-5/E or SDU-39/N	1	MIL-L-38217	00-067-5209 00-411-8535	PAOZZ PAOZZ
Light, Chemical	2	95277-80	01-334-4274	PAOZZ
Signal Mirror, Type I (Note 6) or Signal Mirror, Type II	1	MIL-M-18371	00-105-1252 01-455-6695 01-455-6671	PAOZZ PAOZZ PAOZZ
Survival Radio (Note 3)	1	—	—	—
Code Card (Note 6)	1	—	—	—
Whistle, Type II	1	MIL-W-1053	00-254-8803	PAOZZ
Compass, Pocket	1	MIL-C-17850	00-515-5637	PAOZZ
or Compass, Wrist (Note 7)		WCC-100	00-809-5252	PAOZZ
Pocket Knife	1	MIL-K-818	00-162-2205	PAOZZ
Cord, Nylon, Utility, 50 feet	1	MIL-C-5040	00-240-2154	PAOZZ

Table 15-1. MPLR Survival Items (Cont)

Description	Quantity Required	Reference Number	NIIN	SM&R Code
Notes: 1. MK-189 MOD 0 Signal Kit contains (6) MK-124 MOD 0 Day/Night Flares and (2) MK-79 MOD 0 Flare Guns, is authorized to fill requirements for both type flares. 2. Due to size constraints MROD is not utilized in the LRU-34/A. Water requirements are filled with bagged water only. 3. Sunsect requirements are (3) 0.3 fl. oz. packets per person. 4. Required for arctic missions; optional elsewhere. 5. Survival Radio and Radio beacon requirements shall be in accordance with OPNAVINST 3710.7 Series. Following radios apply: Voice Beacon: AN/PRC-90 and AN/PRC-149. Beacon only: AN/URT-33, AN/PRT-5, AN/PRC-140. The AN/PRC-149 will become the preferred radio when available and when used fills the requirements for voice and beacon. 6. Code Cards must be copied from NAVAIR 13-1.6.5. 7. Use MIL-C-17850 until depleted, then WCC-100. 8. The Type II mirror (large) shall be utilized in lieu of the Type I mirror (small) until stock of the Type II mirror is depleted.				

4. Make necessary entries on appropriate form(s) in accordance with the OPNAVINST 4790.2 Series.



15-25. 448-DAY INSPECTION. To perform a 448-Day Inspection, proceed as follows:

NOTE

The inspection cycle of the LRU-34/A is limited by the installed survival equipment. The inspection cycle may be adjusted to the inspection cycle of the aircraft in which it is installed, i.e. ISIS, Phase. However, it shall not exceed the service life of the installed radio batteries or 448 days, which ever occurs first.

1. Inspect the outer carrying case and attached hardware for wear, cuts, tears, attachment and defects. See paragraph 15-34 for authorized repairs.

NOTE

Should the polymer tub need to be removed for cleaning or repair of the carrying case, see paragraph 15-32.

2. Inspect carrying case for dirt and lubricants. Clean carrying case in accordance with paragraph 15-35.

Pulling on ripcord handle or the attached actuation/mooring line will inflate liferaft.

3. Open the carrying case by unsnapping the snaps and separating the hook and pile fasteners on the protective flaps. Cut and remove the safety tie on the single ripcord pin, then remove the pin and unlace the daisy chain. Unsnap the red ripcord keeper flap and place ripcord handle and actuation/mooring line next to carrying case.

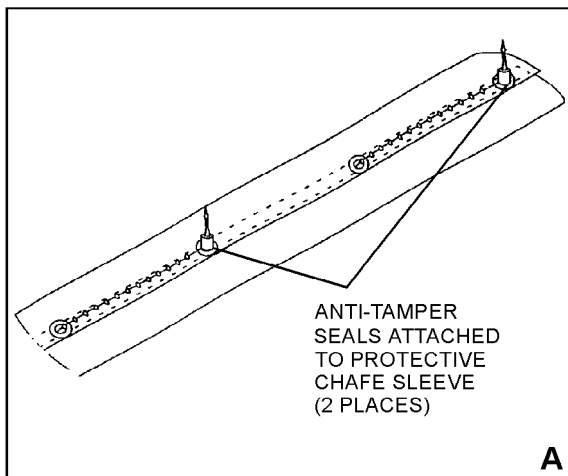
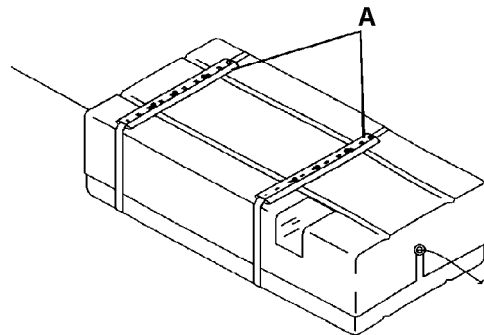
4. Locate the accessory container on top of the liferaft assembly. It has a white nylon retaining line tied to the handles. This retaining line is attached to the liferaft, and enters the tub opposite end of the mooring/actuation line. Remove the accessory container and place it next to the liferaft assembly.

5. Untie and remove the white nylon retaining line from the accessory container handles. Inventory items contained in the accessory container using table 15-1. Inspect the survival items contained in the accessory container in accordance with paragraph 15-28.

6. Verify the charge in the carbon dioxide cylinder by checking the sight gauge located on the inflation valve. The sight gauge is visible through the clear window located in the cover on the polymer tub. The indicator should be in the green. If the indicator is in the red on the gauge submit NAMDRP report in accordance with OPNAVINST 4790.2 Series.

7. Verify the serial number of the liferaft against the manufacturer's maintenance record card located in the pocket found on the top of the carrying case. The serial number for the liferaft is found in two locations, on the polymer tub cover and the carrying case. Note that the manufacturer's record remains with the liferaft at all times.

8. Locate the two liferaft retaining straps that encircle the polymer tub. The straps have urethane coated nylon covers, which protect the frangible links. The covers are secured with hook and pile fasteners, and two nylon anti-tamper seals routed through grommets. Inspect the integrity of the anti-tamper seals. If the frangible links are damaged or broken submit an NAMDRP report in accordance with the OPNAVINST 4790.2 Series.



Step 8 - Para 15-25

15p25s8

9. Pack carrying case in accordance with paragraph 15-31.

15-26. ACCEPTANCE INSPECTION. To perform an Acceptance Inspection, proceed as follows:

NOTE

Acceptance Inspections may consist of checking history records and performing a visual inspection of the liferaft. The liferaft may be inducted to AIMD for further inspection if directed.

1. Locate history records for liferaft assembly. Verify expiration dates for installed equipment.

2. Visually inspect liferaft carrying case and verify serial numbers that are visible without opening liferaft. Ensure vendor's liferaft history record is located in the pocket on top of the carrying case.

3. If directed, or if record and visual inspections detect errors, induct liferaft to AIMD for 448-Day Inspection.

4. Make necessary entries on appropriate form(s) in accordance with the OPNAVINST 4790.2 Series.

15-27. FIVE-YEAR VENDOR OVERHAUL/RE-PACK INSPECTION. To perform a Five-Year Vendor Overhaul/Repack Inspection, proceed as follows:

1. Organizational:

a. Remove the liferaft assembly from the aircraft in accordance with applicable aircraft MIMS and induct to AIMD.

2. AIMD:

a. Place liferaft on clean flat surface. Open container by unsnapping snaps and separating hook and pile fasteners.

b. Locate and remove accessory container. Remove retaining line from accessory container handles by untying bowline knot. Inspect survival items in accordance with paragraph 15-28.

NOTE

The Accessory Container and its contents are NOT returned to the vendor with the liferaft for the vendor overhaul/repack.

- c. Verify liferaft serial number against vendor's maintenance record card located in pocket on carrying case.
- d. Unsnap the red ripcord handle keeper flap, place the actuation/mooring line, the ripcord handle, and the mooring snaphook in the carrying case on top of the liferaft cover.

e. Close carrying case and secure snaps and hook and pile fasteners. Place liferaft in shipping container. Preferred container is type used by vendor for shipping. If no vendor type shipping containers are available, package liferaft to ensure no damage will occur in shipping. If liferaft is damaged in shipping, vendor will add repair charges to repack inspection.

- f. Order vendor overhaul/repack on VIDS MAF using stock number provided in [Section 15-4](#).
- g. AIMD shall issue spare raft from ALSS Pool while liferaft undergoes repack inspection.

h. Liferafts returned from Five-Year Vendor Overhaul/Repack Inspection shall receive a Place-in-Service Inspection prior to re-issue.

15-28. SURVIVAL ITEMS AND ACCESSORIES INSPECTION. To inspect survival items and accessories, proceed as follows:

NOTE

- Refer to NAVAIR 13-1-6.5 for information on inspection/replacement and modification of survival items.
- With exception of batteries, items reaching over-age while packed in survival kits and liferafts shall remain in service until the next inspection cycle of the complete assembly.
- 1. Inventory all accessory and survival items by checking items against [table 15-1](#). Replace missing or unsatisfactory items.

NOTE

Ensure radio battery service life does not expire prior to the next scheduled calendar inspection. Refer to applicable radio maintenance publication for battery service life. Batteries which do not meet service life requirements must not be utilized and shall be turned in to supply for disposal in accordance with local instructions.

- 2. Inspect all items for damage, spent contents, and expired service life. Replace as necessary.
- 3. Operate all items which are not expended in use. Replace as necessary.
- 4. Pack accessory items into accessory container in accordance with [paragraph 15-30](#).

15-29. PACKING.

15-30. PACKING OF SURVIVAL ITEMS IN ACCESSORY CONTAINER. The survival items shall be packed into the accessory container at the Place-in-Service Inspection or after removal for 448-Day Inspection by the intermediate level of maintenance. To pack accessory container, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cord, Nylon, Type III	NIIN 00-240-2146
As Required	Wrap, Cushioning	NIIN 00-142-9008
As Required	Tape, Pressure Sensitive	NIIN 00-266-5016

- 1. Inspect survival items in accordance with [paragraph 15-28](#). Refer to [table 15-1](#) for items used and quantity.

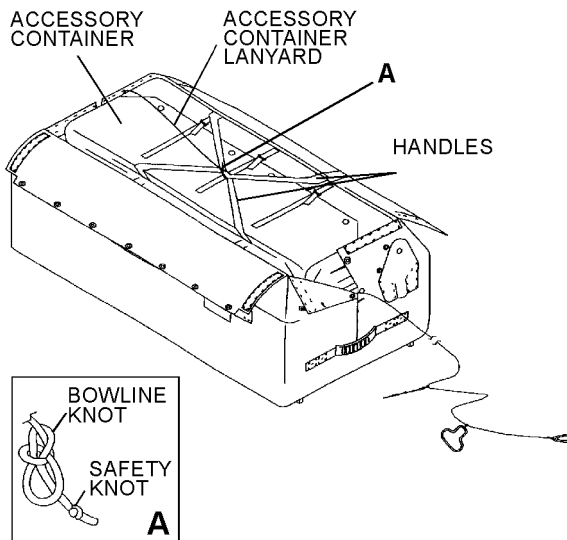
NOTE

- NAVAIR 13-1-6.5 contains information on inspection/replacement and modifications to survival items.
- 2. Wrap breakable survival items with either rubber-coated cloth or cushioning wrap and secure with rubber bands.
 - 3. Stow accessories and survival items in accessory container. Pack items evenly to keep the container as flat as possible.
 - 4. Tie radio(s) to accessory container tie down loops with 48-inch length of Type III nylon cord, using a bowline knot.
 - 5. Secure latches on first aid kit with several layers of pressure sensitive tape. Using an eight-foot length of Type III nylon cord, tie an overhand knot in both ends. Wrap one end of cord two turns, twice around the first aid kit, on the inside of the latches and tie with a surgeon's knot. Route opposite end of cord to accessory container tie down loop and secure with a bowline knot. Stow first aid kit in accessory container.

15-31. PACKING CARRYING CASE. To pack accessory container in carrying case proceed as follows:

1. Locate accessory container retaining line where it exits tub so it is not trapped, place the packed accessory container on top of the liferaft assembly, handles up.

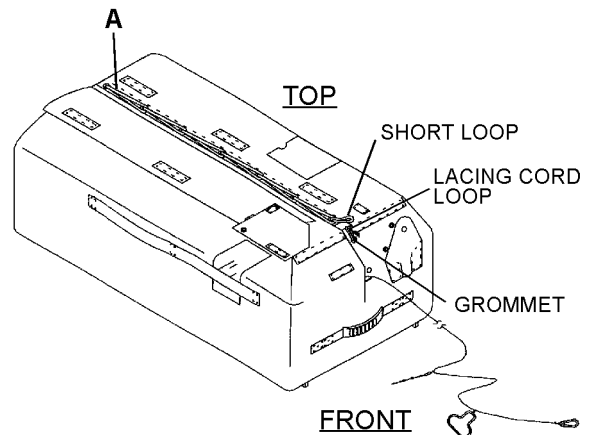
2. Tie the white nylon retaining line to the center handles of the accessory container using a bowline knot. Tack bowline knot with size "E" thread, one turn, secure with surgeon's and square knot. Fake any remaining line at end of container.



Step 2 - Para 15-31

15p31s2

3. Close the carrying case, lace the daisy chain by inserting the lacing cord loops through the grommets and interconnecting the loops. Insert the short loop through the last grommet, place the front lacing cord loop over the short loop, then place the last daisy chain lacing cord loop over the short loop, on top of the front lacing cord loop.

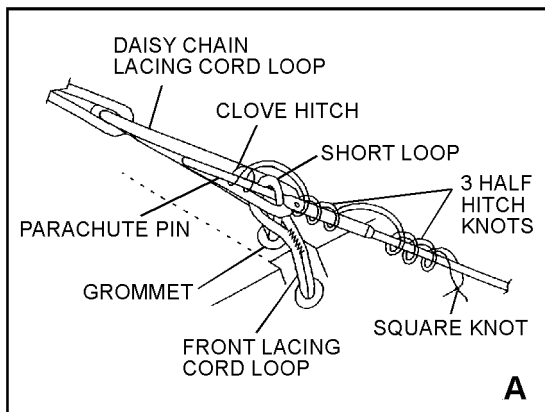
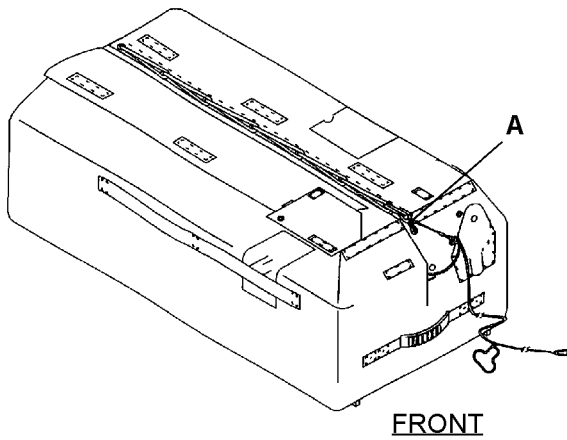


Step 3 - Para 15-31

15p31s3

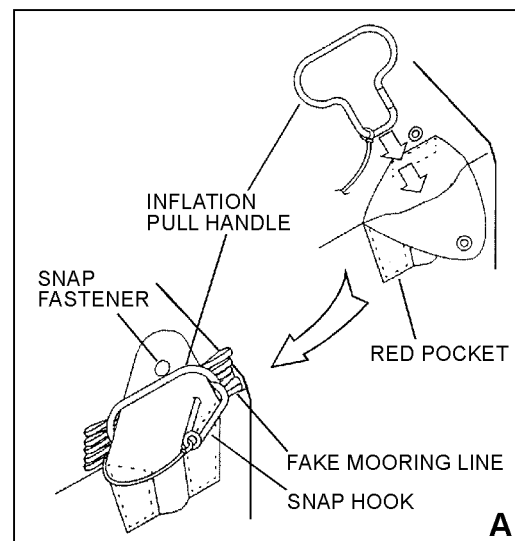
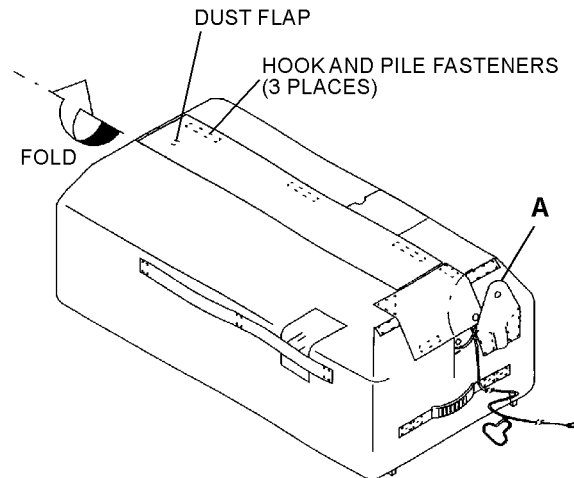
NAVAIR 13-1-6.1-1

4. Insert the ripcord pin between the top of the short loop and the daisy chain loop. Using "E" thread, safety tie the ripcord pin using a clove hitch, half hitches and square knot. Inspect for proper closure of daisy chain and placement of ripcord pin.



Step 4 - Para 15-31

15p31s4



Step 5 - Para 15-31

15p31s5

5. Place ripcord handle in red pocket, carefully fake actuation/mooring line using six-inch width behind ripcord handle, close and snap ripcord keeper flap. Engage mooring snap-hook on front of keeper flap. Close remaining protective covers and secure snaps and hook and pile fasteners.

6. Make necessary entries on appropriate form(s) in accordance with the OPNAVINST 4790.2 Series.

15-32. REMOVING AND REPACKING LIFERAFT ENCLOSURE ASSEMBLY. To remove and replace liferaft enclosure assembly from carrying case to facilitate repairs or cleaning, proceed as follows:

15-33. Removing Liferaft Enclosure Assembly.

1. Place liferaft assembly on clean flat surface.



Pulling on ripcord handle or the attached actuation/mooring line will inflate liferaft.

2. Open the carrying case by unsnapping the snaps and separating the hook and pile fasteners on the protective flaps. Cut and remove the safety tie on the single ripcord pin, then remove the pin and unlace the daisy chain. Unsnap the red ripcord keeper flap and place ripcord handle, actuation/mooring line, and mooring snap hook next to carrying case.

3. Locate the accessory container on top of the liferaft assembly. It has a white nylon retaining line tied to the handles. This retaining line is attached to the liferaft, and enters the tub opposite end of the mooring/actuation line. Remove the accessory container and place it next to the liferaft assembly.

4. Untie and remove the white nylon retaining line from the accessory container handles.

5. Lift liferaft enclosure assembly from carrying case by working hand between carrying case and enclosure assembly so that the enclosure assembly tub can be lifted. Hold carrying case down while pulling upward on enclosure assembly until removed from carrying case.

6. Reposition cover on enclosure assembly tub if it was displaced during removal.

7. Perform required maintenance.

15-34. Repacking Liferaft Enclosure Assembly.

1. Ensure the bottom of the carrying case is free of FOD and sharp objects.

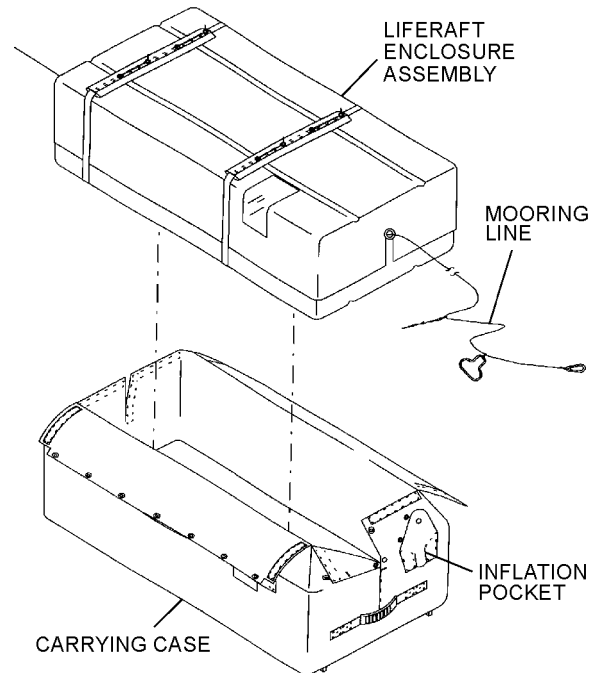


Pulling on ripcord handle or the attached actuation/mooring line will inflate liferaft.

2. Position carrying case and enclosure assembly so the actuation/mooring line will exit the carrying case at the ripcord end when the enclosure assembly is placed in the carrying case.

3. Place the liferaft enclosure assembly in the carrying case. Check to ensure the cover assembly was

not displaced while putting the enclosure assembly in the carrying case. Check for proper routing of actuation/mooring line and accessory container retaining line.



Step 3 - Para 15-34

15p34s3

4. Ensure liferaft is inspected in accordance with paragraph 15-25.

15-35. CLEANING AND SERVICING.

15-36. CLEANING THE LRU-34/A. To clean the LRU-34/A, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint Free, Type II	MIL-C-85043 NIIN 00-044-9281



Solvents are not to be used in cleaning the LRU-34/A liferaft.

1. Dab or blot excess oil, fluid or dirt off of area being cleaned. Do not rub into material.

NAVAIR 13-1-6.1-1

2. Prepare solution of detergent consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

3. Clean affected area with lint free cloth or sponge.

4. Dry with lint free cloth.

15-37. REPAIR/REPLACEMENT.

15-38. Repair of the LRU-34/A is limited to the carrying case and accessory container. No attempt shall

be made to repair the liferaft. Repair of the carrying case and accessory container are limited to replacing loose or broken stitching, and repair of minor cuts using standard shop repair practices. All repairs shall be documented by making necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series. If the liferaft requires repair, it must be returned to the vendor. If the damage was not caused by neglect or abuse, submit an NAMDRP report in accordance with the OPNAVINST 4790.2 Series.

Section 15-4. Illustrated Parts Breakdown

15-39. GENERAL.

15-40. This section lists and illustrates the assemblies and parts of the LRU-34/A, Twenty-eight Person V-22 Liferaft System.

15-41. The illustrated parts breakdown should be used during maintenance when requisitioning and identifying parts.

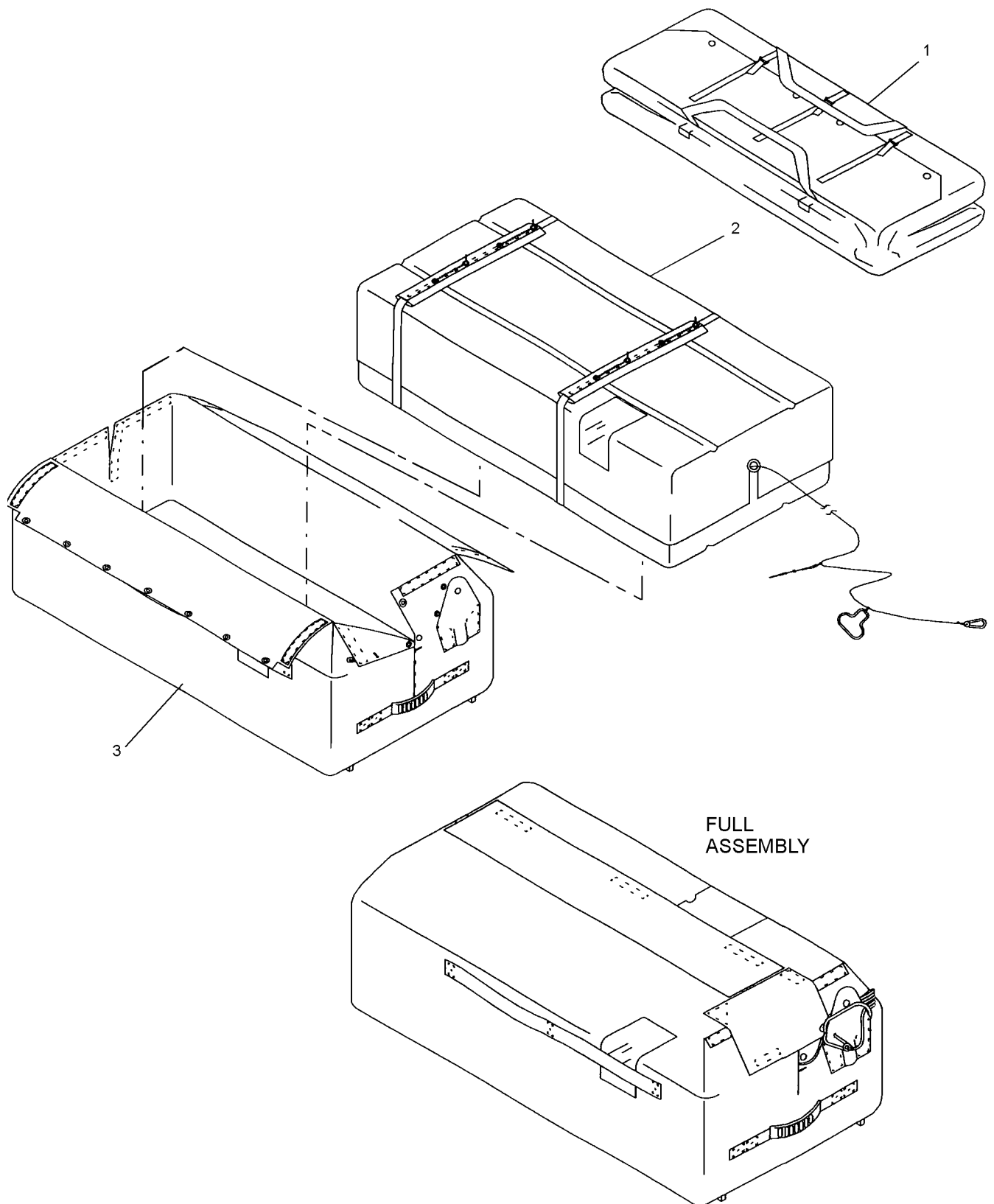


Figure 15-2. Multi-Place Liferaft LRU-34/A

015002

NAVAIR 13-1-6.1-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
15-2	64510-105	LIFERAFT ASSEMBLY LRU-34/A (Note 1)	REF	
-1	64610-103	. SURVIVAL EQUIPMENT CONTAINER LRU-34/A	1	
-2	66105-101	. LIFERAFT AND ENCLOSURE ASSEMBLY ... (Kyde Tub) LRU-34/A (Note 2)	1	
-3	66106-101	. CARRYING CASE, Liferaft LRU-34/A	1	
	—	FIVE YEAR OVERHAUL/Repack (Note 3) (NSN XXXXXXXXXXXXXXXX)	REF	
Notes: 1. Assembly includes Liferaft, Carrying Case, and Survival Equipment Container. Survival equipment must be ordered separately. 2. Enclosure assembly consists of liferaft and tub secured with frangible links only. 3. Order Five Year Overhaul, Repack on VIDS/MAF OPNAVFORM 4790/66.				

APPENDIX A

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APPENDIX B

THE METRIC SYSTEM AND METRIC UNIT CONVERSION CHARTS

The Metric System simply and logically coordinates the measurements of length, area, volume, and mass into one decimalized system. United States currency, with its unexcelled convenience, was the first large scale national use of a decimal system. The ratio between the units of the series - dollars, dimes, cents, and mills - is ten. Additions and other numerical operations are simple. Calculations with metric units require no conversion from unit to unit, as for example between inches and feet or ounces and pounds.

In the Metric System there is one series of units for length, one for area, one for volume or capacity, and one for mass, and one for temperature.

LENGTH - The common metric units of length are the millimeter (mm) for small dimensions, the centimeter (cm) for daily practical use, the meter (m) for expressing dimensions of larger objects and short distances and the kilometer (km) for longer distances. The centimeter is about four-tenths of an inch. The meter is about forty inches and the kilometer about six-tenths of a mile ([figure B-1](#)). When drawing to metric scale, engineering and product dimensions are in millimeters. Architectural drawings can be in millimeters or centimeters. On land surveys the unit is the meter. On maps the kilometer is the unit of measurement.

AREA - Small areas are usually measured in square centimeters (cm²). In building and construction the square meter (m²) is used and is about 20 percent larger than a square yard. The hectare (ha) is used for land surveys and is about 2.5 acres.

VOLUME - For volume the most convenient unit is the cubic decimeter (dm³), referred to as the liter (l). The liter is slightly larger than the U.S. liquid quart but smaller than the U.S. dry quart and the British Imperial quart. The preferred unit for dispensing unit for dispensing drugs and for scientific work is the cubic centimeter (cm³) or milliliter (ml) as it is also called. For measuring amounts of concrete and excavations the cubic meter (m³) is used.

MASS - In pharmaceutical and scientific work the gram (g) is the most convenient unit. There are slightly less than 30 grams in one avoirdupois ounce. For most other uses the kilogram (kg) is convenient and is approximately 2.2 pounds. The metric ton (t), 1000 kg, is used for farm commodities, minerals, and large shipments. It is convenient that a liter of pure water at standard temperature and pressure has a mass of one kilogram (discrepancy less than one part in 10,000). This relationship makes it easy to determine the mass of any known volume of water, or of any other liquid if its specific gravity is known.

TEMPERATURE - All countries using the Metric System of weights and measures also use the Celsius (C) scale (formerly called centigrade) for ordinary measurement of temperature. On the Celsius scale pure water at standard atmospheric pressure freezes at 0° and boils at 100°. Normal human body temperature is 37°, while a comfortable room temperature is about 22°. The preferred temperature scale for engineering and physics is the kelvin (K) which has the same units as the Celsius and where the freezing point of pure water is 273.15 °K.

Index of Units and Conversion Tables

[Figure B-1](#). Reference Conversion Charts

[Table B-4](#). Fraction/Decimal/Millimeter Conversion Chart

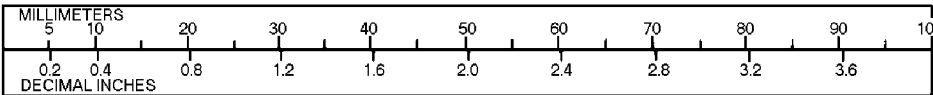
[Table B-1](#). Symbols and Relationships of Metric Units

[Table B-5](#). Metric Unit Conversions

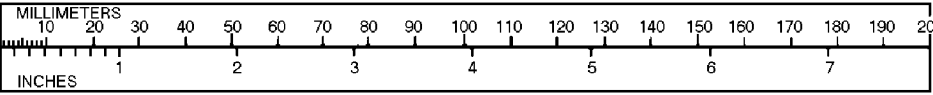
[Table B-2](#). Inches to Millimeters Conversion Chart

[Table B-6](#). Alphabetical Index of Metric Unit Conversions

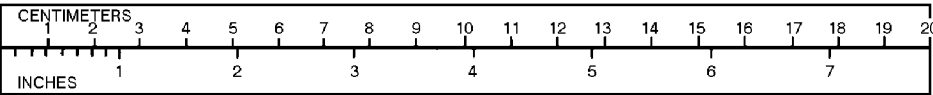
[Table B-3](#). International System of Units



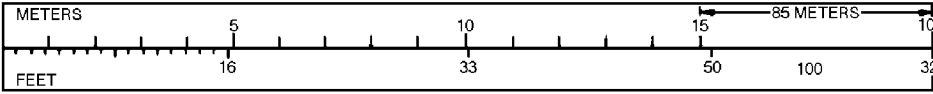
1 Millimeter = 0.03937 Inch Scale - 1 Centimeter = 5 Millimeters



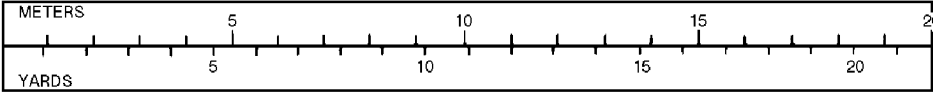
1 Inch = 25.4 Millimeters Scale - 1 Centimeter = 10 Millimeters



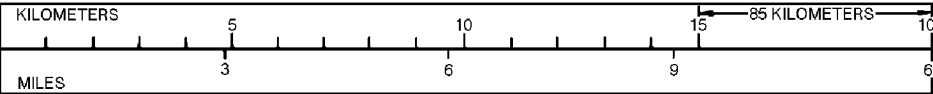
1 Centimeter = 0.39370 Inch Scale - 1 Centimeter = 1 Centimeters
1 Inch = 2.54 Centimeters



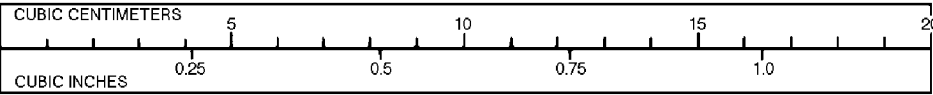
Scale - 1 Centimeter = 1 Meter 1 Foot = 0.3048 Meter
1 Meter = 3.28083 Feet (39.37 Inches - Act of Congress 1866)



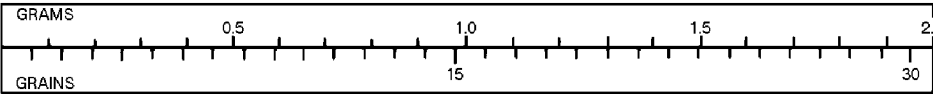
1 Meter = 1.09361 Yards 1 Yard = 0.9144 Meter Scale - 1 Centimeter = 1 Meter



1 Kilometer = 0.62137 Mile Scale - 1 Centimeter = 1 Kilometer
Mile = 1.6093 Kilometers

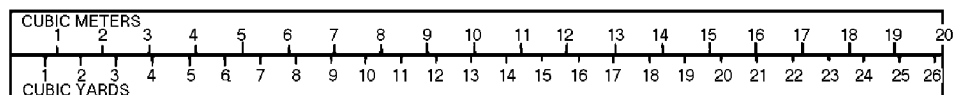


1 Cubic Centimeter = 0.061 Cubic Inch Scale - 1 Centimeter = 1 Cubic Centimeter

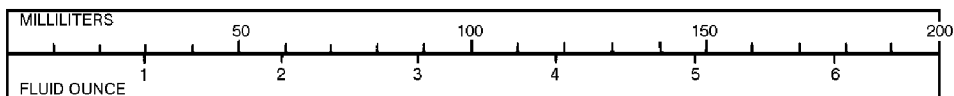


1 Gram = 15.4324 Grains Scale - 1 Centimeter = 0.1 Gram

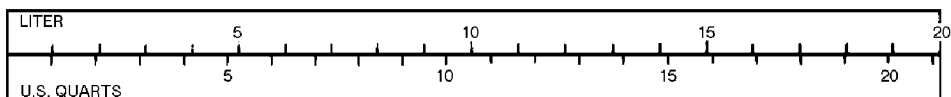
Figure B-1. Reference Conversion Charts (Sheet 1 of 2)



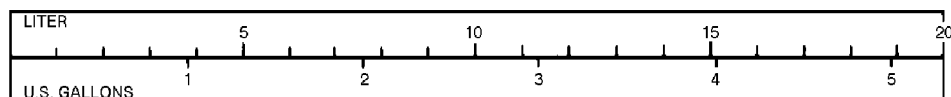
1 Cubic Meter = 1.30795 Cubic meter Scale - 1 Centimeter = 1 Cubic Meter
1 Cubic Yard = 0.76455 Cubic meter



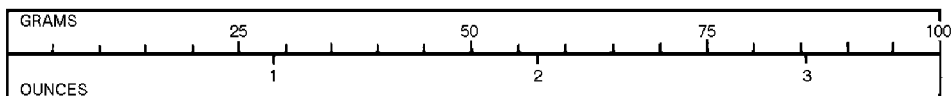
1 Milliliter = 0.03381 Fluid Ounce Scale - 1 Centimeter = 10 Milliliter
1 Fluid Ounce = 29.57 Milliliters



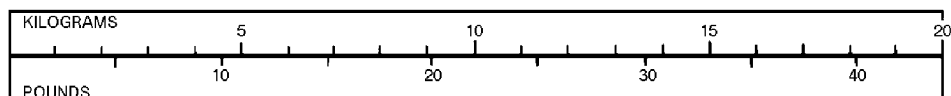
1 Liter = 1.0567 U.S. Quarts 1 U.S. Quart = 0.9463 Liter Scale - 1 Centimeter = 1 Liter



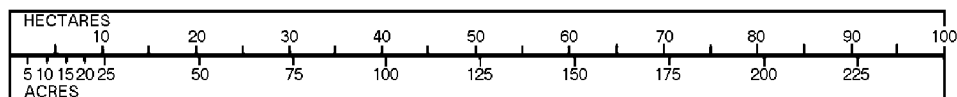
1 Liter = 0.26418 U.S. Gallon Scale - 1 Centimeter = 1 Liter
1 U.S. Gallon = 3.7853 Liters



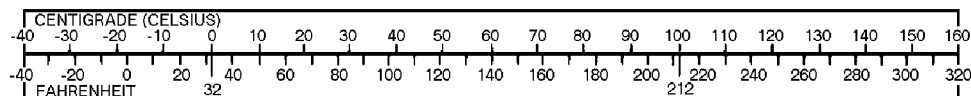
1 Avoirdupois ounce = 28.3495 Grams Scale - 1 Centimeter = 5 Grams



1 Kilogram = 2.2045 Pounds Scale - 1 Centimeter = 1 Kilogram
1 Pound = 0.45359 Kilogram



1 Hectare = 2.47105 Acres Scale - 1 Centimeter = 5 Hectares
1 Acres = 0.40489 Hectares 40 Acres = 16.19 Hectares



Fahrenheit = $\frac{9}{5}$ Centigrade plus 32 Scale - 1 Centigrade = 10° Centigrade
Centigrade = Fahrenheit minus 32 x $\frac{5}{9}$

Figure B-1. Reference Conversion Charts (Sheet 2 of 2)

Table B-1. Symbols and Relationships of Metric Units

Quantity	Unit (Note 1)	Symbol	Relationship of Units
Length	millimeter centimeter decimeter <u>meter (Note 2)</u> kilometer	mm cm dm m km	1 mm = 0.001 m 1 cm = 10 mm 1 dm = 10 cm 1 m = 100 cm 1 km = 1000 m
Area	square centimeter square decimeter <u>square meter (Note 2)</u> are hectare square kilometer	cm ² dm ² m ² a ha km ²	1 cm ² = 100 mm ² 1 dm ² = 100 cm ² 1 m ² = 100 dm ² 1 a = 100 m ² 1 ha = 100 a 1 km ² = 100 ha
Volume	{ cubic centimeter millimeter cubic decimeter liter <u>cubic meter (Note 2)</u>	cm ³ ml dm ³ l m ³	1 cm ³ } = 0.001 l 1 ml } 1 dm ³ } = 1000 ml 1 l } 1 m ³ = 1000 l
Mass*	milligram gram <u>kilogram (Note 2)</u> metric ton	mg g kg t	1 mg = 0.001 g 1 g = 1000 mg 1 kg = 1000 g 1 t = 1000 kg

*Mass is the quantity of matter. Weight is a force Earth's attraction for a given mass. Generally the term mass is meant when we use weight.

Notes: 1. The three main units; meter, liter, and gram can be changed to more convenient sized units for specific purposes by means of several well known prefixes. Milli means 1/1000. Centi means 1/100. Deci means 1/10. Kilo means 1000. One merely learns the main units and the value of the most commonly used prefixes. The symbols for metric units are the same for single and plural amounts and are not followed by a period. Rates are usually shown by use of the slash as in m/s.

2. The underlined units in this table are basic or derived units of the International System of Units (SI).

Table B-2. Inches to Millimeters Conversion Chart

Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
.001	0.0254	.051	1.2954	.101	2.5654	.151	3.8354	.201	5.1054
.002	0.0508	.052	1.3208	.102	2.5908	.152	3.8608	.202	5.1308
.003	0.0762	.053	1.3462	.103	2.6162	.153	3.8862	.203	5.1562
.004	0.1016	.054	1.3716	.104	2.6416	.154	3.9116	.204	5.1816
.005	0.1270	.055	1.3970	.105	2.6670	.155	3.9370	.205	5.2070
.006	0.1524	.056	1.4224	.106	2.6924	.156	3.9624	.206	5.2324
.007	0.1778	.057	1.4478	.107	2.7178	.157	3.9878	.207	5.2578
.008	0.2032	.058	1.4732	.108	2.7432	.158	4.0132	.208	5.2832
.009	0.2286	.059	1.4986	.109	2.7686	.159	4.0386	.209	5.3086
.010	0.2540	.060	1.5240	.110	2.7940	.160	4.0640	.210	5.3340
.011	0.2794	.061	1.5494	.111	2.8194	.161	4.0894	.211	5.3594
.012	0.3048	.062	1.5748	.112	2.8448	.162	4.1148	.212	5.3848
.013	0.3302	.063	1.6002	.113	2.8702	.163	4.1402	.213	5.4102
.014	0.3556	.064	1.6256	.114	2.8956	.164	4.1656	.214	5.4356
.015	0.3810	.065	1.6510	.115	2.9210	.165	4.1910	.215	5.4610
.016	0.4064	.066	1.6764	.116	2.9464	.166	4.2164	.216	5.4864
.017	0.4318	.067	1.7018	.117	2.9718	.167	4.2418	.217	5.5118
.018	0.4572	.068	1.7272	.118	2.9972	.168	4.2672	.218	5.5372
.019	0.4826	.069	1.7526	.119	3.0226	.169	4.2926	.219	5.5626
.020	0.5080	.070	1.7780	.120	3.0480	.170	4.3180	.220	5.5880
.021	0.5334	.071	1.8034	.121	3.0734	.171	4.3434	.221	5.6134
.022	0.5588	.072	1.8288	.122	3.0988	.172	4.3688	.222	5.6388
.023	0.5842	.073	1.8542	.123	3.1242	.173	4.3942	.223	5.6642
.024	0.6096	.074	1.8796	.124	3.1496	.174	4.4196	.224	5.6896
.025	0.6350	.075	1.9050	.125	3.1750	.175	4.4450	.225	5.7150
.026	0.6604	.076	1.9304	.126	3.2004	.176	4.4704	.226	5.7404
.027	0.6858	.077	1.9558	.127	3.2258	.177	4.4958	.227	5.7658
.028	0.7112	.078	1.9812	.128	3.2512	.178	4.5212	.228	5.7912
.029	0.7366	.079	2.0066	.129	3.2766	.179	4.5466	.229	5.8166
.030	0.7620	.080	2.0320	.130	3.3020	.180	4.5720	.230	5.8420
.031	0.7874	.081	2.0574	.131	3.3274	.181	4.5974	.231	5.8674
.032	0.8128	.082	2.0828	.132	3.3528	.182	4.6228	.232	5.8928
.033	0.8382	.083	2.1082	.133	3.3782	.183	4.6482	.233	5.9182
.034	0.8636	.084	2.1336	.134	3.4036	.184	4.6736	.234	5.9436
.035	0.8890	.085	2.1590	.135	3.4290	.185	4.6990	.235	5.9690
.036	0.9144	.086	2.1844	.136	3.4544	.186	4.7244	.236	5.9944
.037	0.9398	.087	2.2098	.137	3.4798	.187	4.7498	.237	6.0198
.038	0.9652	.088	2.2352	.138	3.5052	.188	4.7752	.238	6.0452
.039	0.9906	.089	2.2606	.139	3.5306	.189	4.8006	.239	6.0706
.040	1.0160	.090	2.2860	.140	3.5560	.190	4.8260	.240	6.0960
.041	1.0414	.091	2.3114	.141	3.5814	.191	4.8514	.241	6.1214
.042	1.0668	.092	2.3368	.142	3.6068	.192	4.8768	.242	6.1468
.043	1.0922	.093	2.3622	.143	3.6322	.193	4.9022	.243	6.1722
.044	1.1176	.094	2.3876	.144	3.6576	.194	4.9276	.244	6.1976
.045	1.1430	.095	2.4130	.145	3.6830	.195	4.9530	.245	6.2230
.046	1.1684	.096	2.4384	.146	3.7084	.196	4.9784	.246	6.2484
.047	1.1938	.097	2.4638	.147	3.7338	.197	5.0038	.247	6.2738
.048	1.2192	.098	2.4892	.148	3.7592	.198	5.0292	.248	6.2992
.049	1.2446	.099	2.5146	.149	3.7846	.199	5.0546	.249	6.3246
.050	1.2700	.100	2.5400	.150	3.8100	.200	5.0800	.250	6.3500
.251	6.3754	.301	7.6454	.351	8.9154	.401	10.1854	.451	11.4554
.252	6.4008	.302	7.6708	.352	8.9408	.402	10.2108	.452	11.4808
.253	6.4262	.303	7.6962	.353	8.9662	.403	10.2362	.453	11.5062
.254	6.4516	.304	7.7216	.354	8.9916	.404	10.2616	.454	11.5316
.255	6.4770	.305	7.7470	.355	9.0170	.405	10.2870	.455	11.5570
.256	6.5024	.306	7.7724	.356	9.0424	.406	10.3124	.456	11.5824
.257	6.5278	.307	7.7978	.357	9.0678	.407	10.3378	.457	11.6078
.258	6.5532	.308	7.8232	.358	9.0932	.408	10.3632	.458	11.6332
.259	6.5786	.309	7.8486	.359	9.1186	.409	10.3886	.459	11.6586
.260	6.6040	.310	7.8740	.360	9.1440	.410	10.4140	.460	11.6840
.261	6.6294	.311	7.8994	.361	9.1694	.411	10.4394	.461	11.7094
.262	6.6548	.312	7.9248	.362	9.1948	.412	10.4648	.462	11.7348
.263	6.6802	.313	7.9502	.363	9.2202	.413	10.4902	.463	11.7602
.264	6.7056	.314	7.9756	.364	9.2456	.414	10.5156	.464	11.7856
.265	6.7310	.315	8.0010	.365	9.2710	.415	10.5410	.465	11.8110
.266	6.7564	.316	8.0264	.366	9.2964	.416	10.5664	.466	11.8364
.267	6.7818	.317	8.0518	.367	9.3218	.417	10.5918	.467	11.8618
.268	6.8072	.318	8.0772	.368	9.3472	.418	10.6172	.468	11.8872
.269	6.8326	.319	8.1026	.369	9.3726	.419	10.6426	.469	11.9126
.270	6.8580	.320	8.1280	.370	9.3980	.420	10.6680	.470	11.9380
.271	6.8834	.321	8.1534	.371	9.4234	.421	10.6934	.471	11.9634
.272	6.9088	.322	8.1788	.372	9.4488	.422	10.7188	.472	11.9888
.273	6.9342	.323	8.2042	.373	9.4742	.423	10.7442	.473	12.0142
.274	6.9596	.324	8.2296	.374	9.4996	.424	10.7696	.474	12.0396
.275	6.9850	.325	8.2550	.375	9.5250	.425	10.7950	.475	12.0650
.276	7.0104	.326	8.2804	.376	9.5504	.426	10.8204	.476	12.0904
.277	7.0358	.327	8.3058	.377	9.5758	.427	10.8458	.477	12.1158
.278	7.0612	.328	8.3312	.378	9.6012	.428	10.8712	.478	12.1412
.279	7.0366	.329	8.3566	.379	9.6266	.429	10.8966	.479	12.1666
.280	7.1120	.330	8.3820	.380	9.6520	.430	10.9220	.480	12.1920
.281	7.1374	.331	8.4074	.381	9.6774	.431	10.9474	.481	12.2174
.282	7.1628	.332	8.4328	.382	9.7028	.432	10.9728	.482	12.2428
.283	7.1882	.333	8.4582	.383	9.7282	.433	10.9982	.483	12.2682
.284	7.2136	.334	8.4836	.384	9.7536	.434	11.0236	.484	12.2936
.285	7.2390	.335	8.5090	.385	9.7790	.435	11.0490	.485	12.3190
.286	7.2644	.336	8.5344	.386	9.8044	.436	11.0744	.486	12.3444
.287	7.2898	.337	8.5598	.387	9.8298	.437	11.0998	.487	12.3698
.288	7.3152	.338	8.5852	.388	9.8552	.438	11.1252	.488	12.3952
.289	7.3406	.339	8.6106	.389	9.8806	.439	11.1506	.489	12.4206
.290	7.3660	.340	8.6360	.390	9.9060	.440	11.1760	.490	12.4460
.291	7.3914	.341	8.6614	.391	9.9314	.441	11.2014	.491	12.4714
.292	7.4168	.342	8.6868	.392	9.9568	.442	11.2268	.492	12.4968
.293	7.4422	.343	8.7122	.393	9.9822	.443	11.2522	.493	12.5222
.294	7.4676	.344	8.7376	.394	10.0076	.444	11.2776	.494	12.5476
.295	7.4930	.345	8.7630	.395	10.0330	.445	11.3030	.495	12.5730
.296	7.5184	.346	8.7884	.396	10.0584	.446	11.3284	.496	12.5984
.297	7.5438	.347	8.8138	.397	10.0838	.447	11.3538	.497	12.6238
.298	7.5692	.348	8.8392	.398	10.1092	.448	11.3792	.498	12.6492
.299	7.5946	.349	8.8646	.399	10.1346	.449	11.4046	.499	12.6746
.300	7.6200	.350	8.8900	.400	10.1600	.450	11.4300	.500	12.7000

Table B-3. International System of Units (SI)

Quantity	Unit	Symbol
Elemental units		
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Temperature	degree Kelvin	°K
Luminous intensity	candela	cd
Supplementary units		
Plane angle	radian	rad
Solid angle	steradian	sr
Derived units		
Area	square meter	m ²
Volume	cubic meter	m ³
Frequency	hertz	Hz (s ⁻¹)
Density	kilogram per cubic meter	kg/m ³
Velocity	meter per second	m/s
Angular velocity	radian per second	rad/s
Acceleration	meter per second squared	m/s ²
Angular acceleration	radian per second squared	rad/s ²
Force	newton	N (kg m/s ²)
Pressure	newton per square meter	N/m ²
Kinematic viscosity	square meter per second	m ² /s
Dynamic viscosity	newton-second per square meter	N s/m ²
Work, energy, quantity of heat	joule	J (N m)
Power	watt	W (J/s)
Electric charge	coulomb	C (A s)
Voltage, potential difference, electromotive force	volt	V (W/A)
Electric field strength	volt per meter	V/m
Electric resistance	ohm	Ω (V/A)
Electric capacitance	farad	F (A s/V)
Magnetic flux	weber	Wb (V s)
Inductance	henry	H (V s/A)
Magnetic flux density	tesla	T (Wb/m ²)
Magnetic field strength	ampere per meter	A/m
Magnetomotive force	ampere	A
Luminous flux	lumen	lm (cd sr)
Luminance	candela per square meter	cd/m ²
Illumination	lux	lx (lm/m ²)

USE OF TABLES

Following are step by step directions for the solution to an example conversion problem. The example is: Convert 12 3/4 inches to centimeters.

- Convert all fractions to decimals. (Refer to [table B-3.](#))

$$12 \frac{3}{4} = 12.75$$

- Refer to [table B-4](#) and find the column for the unit which you have. This would be the column labeled “INCHES” in the “Length” table.

- Locate the numeral 1 in the column labeled “INCHES.”

- Locate the column labeled “CENTIMETERS.”

- Read the number in the CENTIMETERS column that is in direct line with the numeral 1 located in the INCHES column.

Read 2.540

- Multiply the number of inches of this example by the conversion factor to obtain the number of centimeters.

$$2.540 \text{ times } 12.75 \text{ equals } 32.385$$

- Round off the answer to not over four significant figures (four numbers counting from the first non-zero number on the left. Fewer significant figures may be used depending on the accuracy of measurement and the tolerances allowed. For most work in this manual, centimeters would be expressed as three significant figures.

$$12 \frac{3}{4} \text{ inches} = 32.4 \text{ centimeters}$$

Table B-4. Fraction/Decimal/Millimeter Conversion Chart

Fractions	Dec Equiv	MM Equiv	Fractions	Dec Equiv	MM Equiv
1/64	0.01562	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	17/32	0.53125	13.494
3/64	0.04688	1.191	35/64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.09375	2.381	19/32	0.59375	15.081
7/64	0.109375	2.778	39/64	0.609375	15.478
1/8	0.125	3.175	5/8	0.625	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.762	11/16	0.6875	17.462
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.25	6.350	3/4	0.75	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.938	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.375	9.525	7/8	0.875	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.5	12.700	1	1.0	25.400

Table B-5. Metric Unit Conversions

Length								
Millimeters	Centimeters	Inches	Feet	Yards	Meters			
1.0	0.1000	0.03937	0.003281	0.001094	0.001000			
10.0	1.0	0.3937	0.03281	0.01094	0.01000			
25.40	2.540	1.0	0.08333	0.02778	0.0254			
304.8	30.48	12.0	1.0	0.3333	0.3048			
914.4	91.44	36.0	3.000	1.0	0.9144			
1000.0	100.0	39.37	3.281	1.094	1.0			
Weight								
Grams	Kilograms	Grains	Ounces Avoirdupois	Pounds Avoirdupois				
1000.0	1.0	15,432.0	35.27	2.205				
1.0	0.0010	15,432	0.03527	0.002205				
0.06480	0.00006480	1.0	0.002286	0.0001429				
28.35	0.02835	437.5	1.0	0.0625				
453.6	0.4536	7,000.0	16.0	1.0				
Velocity								
Meters/Sec	Kilometers/Hr	Feet/Sec	Miles/Hr	Knots				
1.0	3.600	3.281	2.237	1.944				
0.2778	1.0	0.9113	0.6214	0.5400				
0.3048	1.097	1.0	0.6818	0.5925				
0.4470	1.609	1.467	1.0	0.8690				
0.5144	1.852	1.688	1.1511	1.0				
Pressure								
Bars (Mega- baryes)	Kilograms/ square cm	Pounds/ square inch	Atmos- pheres	Columns of Mercury (0°C)		Columns of Water (15°C)		
				Meters	Inches	Meters	Inches	Feet
1.0	1.0197	14.50	0.9869	0.7501	29.53	10.21	401.8	33.49
0.9807	1.0	14.22	0.9678	0.7356	28.96	10.01	394.1	32.84
0.06895	0.07031	1.0	0.06805	0.05171	2.036	0.7037	27.70	2.309
1.0133	1.0332	14.70	1.0	0.7600	29.92	10.34	407.1	33.93
1.3332	1.3595	19.34	1.316	1.0	39.37	13.61	535.7	44.64
0.03386	0.03453	0.4912	0.03342	0.02540	1.0	0.3456	13.61	1.134
0.09798	0.09991	1.421	0.09670	0.07349	2.893	1.0	39.37	3.281
0.002489	0.002538	0.03609	0.002456	0.001867	0.0739	0.02540	1.0	0.08333
0.02986	0.03045	0.4331	0.02947	0.02240	0.8819	0.3048	12.0	1.0
Area								
Square Meters	Square Centimeters	Square Inches	Square Feet	Square Yards				
1.0	10,000.0	1,550.0	10.76	1.196				
0.0001	1.0	0.1550	0.001076	0.0001196				
0.0006452	6,452.0	1.0	0.006944	0.0007716				
0.9290	929.0	144.0	1.0	0.1111				
0.8361	8,361.0	1,296.0	9.0000	1.0				
Volume								
Cubic Inches	Cubic Feet	Cubic Yards	Gallons (U.S.)	Quarts (U.S.)	Liters (Cubic Decimeters)	Cubic Meters	Milliliters (Cubic Centimeters)	
1.0	0.0005787	0.00002143	0.004329	0.01732	0.01639	0.00001639	16.39	
1,728.0	1.0	0.03704	7.481	29.92	28.32	0.02832	28,320	
46,656.0	27.0	1.0	202.2	807.9	764.6	0.7646	764,600	
231.0	0.1337	0.004951	1.0	4.000	3.785	0.003785	3,785	
57.75	0.03342	0.001238	0.2500	1.0	0.9464	0.0009464	946.4	
61.02	0.03531	0.001308	0.2642	1.057	1.0	0.001	1,000	
61020	353.1	1.308	264.2	1057	1000.0	1	1,000,000	
0.06102	0.00003531	0.000001308	0.0002642	0.001057	0.001	0.000001	1	

Table B-6. Alphabetical Index of Metric Unit Conversions

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
A			B (Cont)		
Abcoulomb	Statcoulombs	2.998 X 10 ¹⁰	Baryl	Dyne/sq. cm.	1.000
Acre	Sq. chain (Gunters)	10	Bolt (US Cloth)	Meters	36.576
Acre	Rods	160	BTU	Liter-Atmosphere	10.409
Acre	Square links (Gunters)	1 x 10 ⁵	Btu	ergs	1.0550 X 10 ¹⁰
Acre	Hectare or		Btu	foot-lbs	778.3
	sq.hectometer	0.4047	Btu	gram-calories	252.0
acres	sq feet	43,560.0	Btu	horsepower-hrs	3.931 X 10 ⁻⁴
acres	sq meters	4,047.	Btu	joules	1,054.8
acres	sq miles	1.562 X 10 ⁻³	Btu	kilogram-calories	0.2520
acres	sq yards	4,840.	Btu	kilogram-meters	107.5
acre-feet	cu feet	43,560.0	Btu	kilowatt-hrs	2.928 X 10 ⁻⁴
acre-feet	gallons	3.259 X 10 ⁴	Btu/hr	foot-pounds/sec	0.2162
amperes/sq cm	amps/sq in.	6.452	Btu/hr	gram-cal/sec	0.0700
amperes/sq cm	amps/sq meter	10 ⁴	Btu/hr	horsepower-hrs	3.929 X 10 ⁻⁴
amperes/sq in.	amps/sq cm	0.1550	Btu/hr	watts	0.2931
amperes/sq in.	amps/sq meter	1,550.0	Btu/min	foot-lbs/sec	12.96
amperes/sq meter	amps/sq cm	10 ⁻⁴	Btu/min	horsepower	0.02356
amperes/sq meter	amps/sq in.	6.452 X 10 ⁻⁴	Btu/min	kilowatts	0.01757
ampere-hours	coulombs	3,600.0	Btu/min	watts	17.57
ampere-hours	faradays	0.03731	Btu/sq ft/min	watts/sq in.	0.1221
ampere-turns	gilberts	1.257	Bucket (Br. dry)	Cubic Cm.	1.818 X 10 ⁴
ampere-turns/cm	amp-turns/in.	2.540	bushels	cu ft	1.2445
ampere-turns/cm	amp-turns/meter	100.0	bushels	cu in.	2,150.4
ampere-turns/cm	gilberts/cm	1.257	bushels	cu meters	0.03524
ampere-turns/in.	amp-turns/cm	0.3937	bushels	liters	35.24
ampere-turns/in.	amp-turns/meter	39.37	bushels	pecks	4.0
ampere-turns/in.	gilberts/cm	0.4950	bushels	pints (dry)	64.0
ampere-turns/meter	amp/turns/cm	0.01	bushels	quarts (dry)	32.0
ampere-turns/meter	amp-turns/in.	0.0254			
ampere-turns/meter	gilberts/cm	0.01257		C	
Angstrom unit	Inch	3937 X 10 ⁻⁹	Calories, gram(mean)	B.T.U. (mean)	3.9685 X 10 ⁻³
Angstrom unit	Meter	1 X 10 ⁻¹⁰	Candle/sq. cm	Lamberts	3.142
Angstrom unit	Micron or (Mu)	1 X 10 ⁻⁴	Candle/sq. inch	Lamberts	0.4870
Are	Acre (US)	0.02471	Centares (centiares)	sq meters	1.0
Ares	sq. yards	119.60	Centigrade	Fahrenheit	(C° X 9/5) + 32
ares	acres	0.02471	centigrams	grams	0.01
ares	sq meters	100.0	Centiliter	Ounce fluid (US)	0.3382
Astronomical Unit	Kilometers	1.495 X 10 ⁸	Centiliter	Cubic inch	0.6103
Atmospheres	Ton/sq. inch	0.007348	Centiliter	drams	2.705
atmospheres	cms of mercury	76.0	centiliters	liters	0.01
atmospheres	ft of water (at 4°C)	33.90	centimeters	feet	3.281 X 10 ⁻²
atmospheres	in. of mercury (at 0°C)	29.92	centimeters	inches	0.3937
atmospheres	kgs/sq cm	1.0333	centimeters	kilometers	10 ⁻⁵
atmospheres	kgs/sq meter	10,332	centimeters	meters	0.01
atmospheres	pounds/sq in.	14.70	centimeters	miles	6.214 X 10 ⁻⁸
atmospheres	tons/sq ft	1.058	centimeters	millimeters	10.0
			centimeters	mils	393.7
			centimeters	yards	1.024 X 10 ⁻²
			centimeter-dynes	cm-grams	1.020 X 10 ⁻³
			centimeter-dynes	meter-kgs	1.020 X 10 ⁻⁸
			centimeter-dynes	pound-feet	7.376 X 10 ⁻⁸
			centimeter-grams	cm-dynes	980.7
			centimeter-grams	meter-kgs	10 ⁻⁵
			centimeter-grams	pound-feet	7.233 X 10 ⁻⁵
			centimeters of mercury	atmospheres	0.01316
			centimeters of mercury	feet of water	0.4461
			centimeters of mercury	kgs/sq meter	136.0
B					
Barrels (U.S., dry)	cu. inches	7056.0			
Barrels (U.S., dry)	quarts (dry)	105.0			
Barrels (U.S., liquid)	gallons	31.5			
barrels (oil)	gallons (oil)	42.0			
bars	atmospheres	0.9869			
bars	dynes/sq cm	10 ⁴			
bars	kgs/sq meter	1.020 X 10 ⁴			
bars	pounds/sq ft	2,089.0			
bars	pounds/sq in.	14.50			

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
C (Cont)			C (Cont)		
centimeters of mercury	pounds/sq ft	27.85	cubic inches	gallons	4.329×10^{-3}
centimeters of mercury	pounds/sq in.	0.1934	cubic inches	liters	0.01639
centimeters/sec	feet/min	1.1969	cubic inches	mil-feet	1.061×10^5
centimeters/sec	feet/sec	0.03281	cubic inches	pints(U.S. liq.)	0.03463
centimeters/sec	kilometers/hr	0.036	cubic inches	quarts(U.S. liq.)	0.01732
centimeters/sec	knots	0.1943	cubic meters	bushels (dry)	28.38
centimeters/sec	miles/hr	0.02237	cubic inches	cu yards	2.143×10^{-5}
centimeters/sec	miles/min	3.728×10^{-4}	cubic meters	cu cms	10^4
centimeters/sec/sec	feet/sec/sec	0.03281	cubic meters	cu feet	35.31
centimeters/sec/sec	kms/hr/sec	0.036	cubic meters	cu inches	61,023.0
centimeters/sec/sec	meters/sec/sec	0.01	cubic meters	cu yards	1.308
centimeters/sec/sec	miles/hr/sec	0.02237	cubic meters	gallons (U.S. liq.)	264.2
Chain	Inches	792.00	cubic meters	liters	1,000.0
Chain	meters	20.12	cubic meters	pints(U.S. liq.)	2,113.0
Chains (surveyors' or Gunter's)	yards	22.00	cubic meters	quarts (U.S. liq.)	1,057.0
circular mils	sq cms	5.067×10^{-6}	cubic yards	cu cms	7.646×10^5
circular mils	sq mils	0.7854	cubic yards	cu feet	27.0
Circumference	Radians	6.283	cubic yards	cu inches	46,656.0
circular mils	sq inches	7.854×10^{-7}	cubic yards	cu meters	0.7646
Cords	cord feet	8	cubic yards	gallons (U.S. liq.)	202.0
Cord feet	cu. feet	16	cubic yards	liters	764.6
Coulomb	Statcoulombs	2.998×10^9	cubic yards	pints (U.S. liq.)	1,615.9
coulombs	faradays	1.036×10^{-5}	cubic yards	quarts (U.S. liq.)	807.9
coulombs/sq cm	coulombs/sq in.	64.52	cubic yards/min	cubic ft/sec	0.45
coulombs/sq cm	coulombs/sq meter	10^4	cubic yards/min	gallons/sec	3.367
coulombs/sq in.	coulombs/sq cm	0.1550	cubic yards/min	liters/sec	12.74
coulombs/sq in.	coulombs/sq meter	1,550.0	D		
coulombs/sq meter	coulombs/sq cm	10	Dalton	Gram	1.650×10^{-24}
coulombs/sq meter	coulombs/sq in.	6.452×10^{-4}	days	seconds	86,400.0
cubic centimeters	cu feet	3.531×10^{-5}	decigrams	grams	0.1
cubic centimeters	cu inches	0.06102	deciliters	liters	0.1
cubic centimeters	cu meters	10^{-6}	decimeters	meters	0.1
cubic centimeters	cu yards	1.308×10^{-6}	degrees (angle)	quadrants	0.01111
cubic centimeters	gallons (U.S. liq.)	2.642×10^{-4}	degrees (angle)	radians	0.01745
cubic centimeters	liters	0.001	degrees (angle)	seconds	3,600.0
cubic centimeters	pints (U.S. liq.)	2.113×10^{-3}	degrees/sec	radians/sec	0.01745
cubic centimeters	quarts (U.S. liq.)	1.057×10^{-3}	degrees/sec	revolutions/min	0.1667
cubic feet	bushels (dry)	0.8036	degrees/sec	revolutions/sec	2.778×10^{-3}
cubic feet	cu cms	28,320.0	dekagrams	grams	10.0
cubic feet	cu inches	1,728.0	dekaliters	liters	10.0
cubic feet	cu meters	0.02832	dekameters	meters	10.0
cubic feet	cu yards	0.03704	Drams (apothecaries' or troy)	ounces (avoirdupois)	0.1371429
cubic feet	gallons (U.S. liq.)	7.48052	Drams (apothecaries' or troy)	ounces (troy)	0.125
cubic feet	liters	28.32	Drams (U.S., fluid or apoth.)	cubic cm.	3.6967
cubic feet	pints (U.S. liq.)	59.84	drams	grams	1.7718
cubic feet	quarts (U.S. liq.)	29.92	drams	grains	27.3437
cubic feet/min	cu cms/sec	472.0	drams	ounces	0.0625
cubic feet/min	gallons/sec	0.1247	Dyne/cm	Erg/sq. millimeter	0.01
cubic feet/min	liters/sec	0.4720	Dyne/sq. cm.	Atmospheres	9.869×10^{-7}
cubic feet/min	pounds of water/min	62.43	Dyne/sq. cm.	Inch of Mercury at 0°C	2.953×10^{-5}
cubic feet/sec	million gals/day	0.646317	Dyne/sq. cm.	Inch of Water at 4°C	4.015×10^{-4}
cubic feet/sec	gallons/min	448.831	dynes	grams	1.020×10^{-3}
cubic inches	cu cms	16.39	dynes	joules/cm	10^{-7}
cubic inches	cu feet	5.787×10^{-4}	dynes	joules/meter (newtons)	10^{-5}
cubic inches	cu meters	1.639×10^{-5}			
cubic inches	cu yards	2.143×10^{-5}			

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
D (Cont)			F (Cont)		
dynes	kilograms	1.020×10^{-6}	feet/sec	kms/hr	1.097
dynes	poundals	7.233×10^{-5}	feet/sec	knots	0.5921
dynes	pounds	2.248×10^{-6}	feet/sec	meters/min	18.29
dynes/sq cm	bars	10^{-6}	feet/sec	miles/hr	0.6818
			feet/sec	miles/min	0.01136
E			feet/sec	cms/sec	30.48
Ell	Cm.	114.30	feet/sec/sec	cms/sec/sec	30.48
Ell	Inches	45	feet/sec/sec	kms/hr/sec	1.097
Em, Pica	Inch	0.167	feet/sec/sec	meters/sec/sec	0.3048
Em, Pica	Cm.	0.4233	feet/sec/sec	miles/hr/sec	0.6818
Erg/sec	Dyne - cm/sec	1.000	feet/100 feet	per cent grade	1.0
ergs	Btu	9.480×10^{-11}	Foot - candle	Lumen/sq. meter	10.764
ergs	dyne-centimeters	1.0	foot-pounds	Btu	1.286×10^{-3}
ergs	foot-pounds	7.367×10^{-8}	foot-pounds	ergs	1.356×10^7
ergs	gram-calories	0.2389×10^{-7}	foot-pounds	gram-calories	0.3238
ergs	gram-cms	1.020×10^{-3}	foot-pounds	hp-hrs	5.050×10^{-7}
ergs	horsepower-hrs	3.7250×10^{-14}	foot-pounds	joules	1.356
			foot-pounds	kg-calories	3.24×10^{-4}
E (Cont)			foot-pounds	kg-meters	0.1383
ergs	joules	10^{-7}	foot-pounds	kilowatt-hrs	3.766×10^{-7}
ergs	kg-calories	2.389×10^{-11}	foot-pounds/min	Btu/min	1.286×10^{-3}
ergs	kg-meters	1.020×10^{-8}	foot-pounds/min	foot-pounds/sec	0.01667
ergs	kilowatt-hrs	0.2778×10^{-13}	foot-pounds/min	horsepower	3.030×10^{-5}
ergs	watt-hours	0.2778×10^{-18}	foot-pounds/min	kg-calories/min	3.24×10^{-4}
ergs/sec	Btu/min	5.688×10^{-6}	foot-pounds/min	kilowatts	2.260×10^{-5}
ergs/sec	ft-lbs/min	4.427×10^{-6}	foot-pounds/sec	Btu/hr	4.6263
ergs/sec	ft-lbs/sec	7.3756×10^{-8}	foot-pounds/sec	Btu/min	0.07717
ergs/sec	horsepower	1.341×10^{-10}	foot-pounds/sec	horsepower	1.818×10^{-3}
ergs/sec	kg-calories/min	1.433×10^{-9}	foot-pounds/sec	kg-calories/min	0.01945
ergs/sec	kilowatts	10^{-10}	foot-pounds/sec	kilowatts	1.356×10^{-3}
			Furlongs	miles(U.S.)	0.125
F			furlongs	rods	40.0
farads	microfarads	10^6	furlongs	feet	660.0
Faraday/sec	Ampere (absolute)	9.6500×10^4			
faradays	ampere-hours	26.80	G		
faradays	coulombs	9.649×10^4	gallons	cu cms	3,785.0
Fathom	Meter	1.828804	gallons	cu feet	0.1337
fathoms	feet	6.0	gallons	cu inches	231.0
feet	centimeters	30.48	gallons	cu meters	3.785×10^{-3}
feet	kilometers	3.048×10^{-4}	gallons	cu yards	4.951×10^{-3}
feet	meters	0.3048	gallons	liters	3.785
feet	miles (naut.)	1.645×10^{-4}	gallons (liq Br. Imp.)	gallons (U.S. liq)	1.20095
feet	miles (stat.)	1.894×10^{-4}	gallons (U.S.)	gallons (Imp.)	0.83267
feet	millimeters	304.8	gallons of water	pounds of water	8.3453
feet	mils	1.2×10^4	gallons/min	cu ft/sec	2.228×10^{-3}
feet of water	atmospheres	0.02950	gallons/min	liters/sec	0.06308
feet of water	in. of mercury	0.8826	gallons/min	cu ft/hr	8.0208
feet of water	kgs/sq cm	0.03048	gausses	lines/sq in.	6.452
feet of water	kgs/sq meter	304.8	gausses	webers/sq cm	10^{-8}
feet of water	pounds/sq ft	62.43	gausses	webers/sq in.	6.452×10^{-8}
feet of water	pounds/sq in	0.4335	gausses	webers/sq meter	10^{-4}
feet/min	cms/sec	0.5080	gilberts	ampere-turns	0.7958
feet/min	feet/sec	0.01667	gilberts/cm	amp-turns/cm	0.7958
feet/min	kms/hr	0.01829	gilberts/cm	amp-turns/in	2.021
feet/min	meters/min	0.3048	gilberts/cm	amp-turns/meter	79.58
feet/min	miles/hr	0.01136	Gills (British)	cubic cm.	142.07
feet/sec	cms/sec	30.48	gills	liters	0.1183
			gills	pints (liq.)	0.25

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
G (Cont)			H (Cont)		
Grade	Radian	0.01571	horsepower	horsepower (metric)	1.014
Grains	drams (avoirdupois)	0.03657143	(550 ft lb/sec)	(542.5 ft lb/sec)	
grains (troy)	grains (avdp)	1.0	horsepower	kg-calories/min	10.68
grains (troy)	grams	0.06480	horsepower	kilowatts	0.7457
grains (troy)	ounces (avdp)	2.0833 X 10 ⁻³	horsepower	watts	745.7
grains (troy)	pennyweight (troy)	0.04167	horsepower (boiler)	Btu/hr	33.479
grains/U.S. gal	parts/million	17.118	horsepower (boiler)	kilowatts	9.803
grains/U.S. gal	pounds/million gal	142.86	horsepower-hrs	Btu	2,547.0
grains/Imp. gal	parts/million	14.286	horsepower-hrs	ergs	2.6845 X 10 ¹³
grams	dynes	980.7	horsepower-hrs	foot-lbs	1.98 X 10 ⁴
grams	grains	15.43	horsepower-hrs	gram-calories	641,190.0
grams	joules/cm	9.807 X 10 ⁻⁵	horsepower-hrs	joules	2.684 X 10 ⁴
grams	joules/meter (newtons)	9,807 X 10 ⁻³	horsepower-hrs	kg-calories	641.1
grams	kilograms	0.001	horsepower-hrs	kg-meters	2.737 X 10 ⁵
grams	milligrams	1,000.0	horsepower-hrs	kilowatts-hrs	0.7457
grams	ounces (avdp)	0.03527	hours	days	4.167 X 10 ⁻²
grams	ounces (troy)	0.03215	hours	weeks	5.952 X 10 ⁻³
grams	poundals	0.07093	Hundredweights (long)	pounds	112
grams	pounds	2.205 X 10 ⁻³	Hundredweights (long)	tons (long)	0.05
grams/cm	pounds/inch	5.600 X 10 ⁻³	Hundredweights (short)	ounces (avoirdupois)	1600
grams/cu cm	pounds/cu ft	62.43	Hundredweights (short)	pounds	100
grams/cu cm	pounds/cu in	0.03613	Hundredweights (short)	tons (metric)	0.0453592
grams/cu cm	pounds/mil-foot	3.405 X 10 ⁻⁷	Hundredweights (short)	tons (long)	0.0446429
grams/liter	grains/gal	58.417			
grams/liter	pounds/1,000 gal	8.345			
grams/liter	pounds/cu ft	0.062427		I	
grams/liter	parts/million	1,000.0	inches	centimeters	2.540
grams/sq cm	pounds/sq ft	2.0481	inches	meters	2.540 X 10 ⁻²
gram-calories	Btu	3.9683 X 10 ⁻³	inches	miles	1.578 X 10 ⁻⁵
gram-calories	ergs	4.1868 X 10 ⁷	inches	millimeters	25.40
gram-calories	foot-pounds	3.0880	inches	mils	1,000.0
gram-calories	horsepower-hrs	1.5596 X 10 ⁻⁶	inches	yards	2.778 X 10 ⁻²
gram-calories	kilowatt-hrs	1.1630 X 10 ⁻⁶	inches of mercury	atmospheres	0.03342
gram-calories	watt-hrs	1.1630 X 10 ⁻³	inches of mercury	feet of water	1.133
grams-calories/sec	Btu/hr	14.286	inches of mercury	kgs/sq cm	0303453
gram-centimeters	Btu	9.297 X 10 ⁻⁸	inches of mercury	kgs sq meter	345.3
gram-centimeters	ergs	980.7	inches of mercury	pounds/sq ft	70.73
gram-centimeters	joules	9.807 X 10 ⁻⁵	inches of mercury	pounds/sq in.	0.4912
gram-centimeters	kg-cal	2.343 X 10 ⁻⁸	inches of mercury	atmospheres	2.458 X 10 ⁻³
gram-centimeters	kg-meters	10 ⁻⁵	inches of water (at 4°C)	inches of mercury	0.07355
			inches of water (at 4°C)	kgs/sq cm	2.540 X 10 ⁻³
			inches of water (at 4°C)	ounces/sq in.	0.5781
			inches of water (at 4°C)	pounds/sq ft	5.204
			inches of water (at 4°C)	pounds/sq in.	0.03613
			International Ampere	Ampere (absolute)	0.9998
			International Volt	Volts (absolute)	1.0003
			International volt	Joules (absolute)	1-593 X 10 ⁻¹⁹
			International volt	Joules	9.654 X 10 ⁴
				J	
Hand	Cm.	10.16	joules	Btu	9.480 X 10 ⁻⁴
hetacres	acres	2.471	joules	ergs	10 ⁷
hectares	sq feet	1.076 X 10 ⁵	joules	foot-pounds	0.7376
hectograms	grams	100.0	joules	kg calories	2.389 X 10 ⁻⁴
hectoliters	liters	100.0	joules	kg-meters	0.1020
hectometers	meters	100.0	joules	watt-hrs	2.778 X 10 ⁻⁴
hectowatts	watts	100.0	joules/cm	grams	1.020 X 10 ⁴
henries	millihenries	1,000.0	joules/cm	dynes	10 ⁷
Hogsheads (British)	cubic ft.	10.114			
Hogsheads (U.S.)	cubic ft.	8.42184			
Hogsheads (U.S)	gallons (U.S.)	63			
horsepower	Btu/min	42.44			
horsepower	foot-lbs/min	33,000.0			
horsepower	foot-lbs/sec	550.0			
horsepower (metric)	horsepower	0.9863			
(542.5 ft lb/sec)	(550 ft lb/sec)				

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
J (Cont)			K (Cont)		
joules/cm	joules/meter (newtons)	100.0	kilometers/hr/sec	cms/sec/sec	27.78
joules/cm	poundals	723.3	kilometers/hr/sec	ft/sec/sec	0.9113
joules/cm	pounds	22.48	kilometers/hr/sec	meters/sec/sec	0.2778
			kilometers/hr/sec	miles/hr/sec	0.6214
			kilowatts	Btu/min	56.92
			kilowatts	foot-lbs/min	4.426 X 10 ⁴
			kilowatts	foot-lbs/sec	737.6
			kilowatts	horsepower	1.341
			kilowatts	kg-calories/min	14.34
			kilowatts	watts	1,000.0
			kilowatt-hrs	Btu	3,413.0
			kilowatt-hrs	ergs	3.600 X 10 ¹³
			kilowatt-hrs	foot-lbs	2.655 X 10 ⁴
			kilowatt-hrs	gram-calories	859,850.0
			kilowatt-hrs	horsepower-hrs	1.341
			kilowatt-hrs	joules	3.6 X 10 ⁴
			kilowatt-hrs	kg-calories	860.5
			kilowatt-hrs	kg-meters	3.671 X 10 ⁵
			kilowatt-hrs	pounds of water evaporated from and at 212°F	3.53
			kilowatt-hrs	pounds of water raised from 62° to 212°F	22.75
			knots	feet/hr	6,080.0
			knots	kilometers/hr	1.8532
			knots	nautical miles/hr	1.0
			knots	statute miles/hr	1.151
			knots	yards/hr	2,027.0
			knots	feet/sec	1.689
				L	
			league	miles(approx.)	3.0
			Light year	Miles	5.9 X 10 ¹²
			Light year	Kilometers	9.46091 X 10 ¹²
			lines/sq cm	gausses	1.0
			lines/sq in.	gausses	0.1550
			lines/sq in.	webers/sq cm	1.550 X 10 ⁻⁹
			lines/sq in.	webers/sq in.	10 ⁻⁸
			lines/sq in.	webers/sq meter	1.550 X 10 ⁻⁵
			links (engineer's)	inches	12.0
			links (surveyor's)	inches	7.92
			liters	bushels (U.S. dry)	0.02838
			liters	cu cm	1,000.0
			liters	cu inches	61.02
			liters	cu meters	0.001
			liters	cu yards	1.308 X 10 ⁻³
			liters	gallons (U.S. liq.)	0.2642
			liters	pints (U.S. liq.)	2.113
			liters	quarts (U.S. liq.)	1.057
			liters/min	cu ft/sec	5.886 X 10 ⁻⁴
			liters/min	gals/sec	4.403 X 10 ⁻³
			lumens/sq ft	foot-candles	1.0
			Lumen	Spherical candle power	0.07958
			Lumen	Watt	0.001496
			Lumen/sq. ft.	Lumen/sq. meter	10.76
			lux	foot-candles	0.0929

TO CONVERT	INTO	MULTIPLY BY
M		
maxwells	kilolines	0.001
maxwells	webers	10 ⁻³
megalines	maxwells	10 ⁴
megohms	microhms	10 ¹²
megohms	ohms	10 ⁶
meters	centimeters	100.0
meters	feet	3.281
meters	inches	39.37
meters	kilometers	0.001
meters	miles (stat.)	6.214 X 10 ⁻⁴
meters	millimeters	1,000.0
meters	yards	1.094
meters	yards	1.179
meters/min	cms/sec	1.667
meters/min	feet/min	3.281
meters/min	feet/sec	0.05468
meters/min	kms/hr	0.06
meters/min	knots	0.03238
meters/min	miles/hr	0.03728
meters/sec	feet/min	196.8
meters/sec	feet/sec	3.281
meters/sec	kilometers/hr	3.6
meters/sec	kilometers/min	0.06
meters/sec	miles/hr	2.237
meters/sec	miles/min	0.03728
meters/sec/sec	cms/sec/sec	100.0
meters/sec/sec	ft/sec/sec	3.281
meters/sec/sec	kms/hr/sec	3.6
meters/sec/sec	miles/hr/sec	2.237
meter-kilograms	cm-dynes	9.807 X 10 ⁷
meter-kilograms	cm-grams	10 ⁵
meter-kilograms	pound-foot	7.233
microfarad	farads	10 ⁻⁶
micrograms	grams	10 ⁻⁶
microhms	megohms	10 ⁻¹²
microhms	ohms	10 ⁻⁶
microliters	liters	10 ⁻⁶
Microns	meters	1 X 10 ⁻⁶
miles (naut.)	feet	6,080.27
miles (naut.)	kilometers	1.853
miles (naut.)	meters	1,853.0
miles (naut.)	miles (statute)	1.1516
miles (naut.)	yards	2,027.0
miles (statute)	centimeters	1.609 X 10 ⁵
miles (statute)	feet	5,280.0
miles (statute)	inches	6.336 X 10 ⁴
miles (statute)	kilometers	1.609
miles (statute)	meters	1,609.0
miles (statute)	miles (naut)	0.8684
miles (statute)	yards	1,760.0
miles/hr	cms/sec.	44.70
miles/hr	feet/min	88.0
miles/hr	feet/sec	1.467
miles/hr	kms/hr	1.609
miles/hr	kms/min	0.02682
miles/hr	kms/min	0.02682
miles/hr	knots	0.8684
miles/hr	meters/min	26.82
miles/hr	miles/min	0.1667

TO CONVERT	INTO	MULTIPLY BY
M (Cont)		
miles/hr/sec	cms/sec/sec	44.70
miles/hr/sec	feet/sec/sec	1.467
miles/hr/sec	kms/hr/sec	1.609
miles/hr/sec	meters/sec/sec	0.4470
miles/min	cms/sec	2,682.0
miles/min	feet/sec	88.0
miles/min	kms/minn	1.609
miles/min	knots/min	0.8684
miles/min	miles/hr	60.0
mil-feet	cu inches	9.425 X 10 ⁻⁶
milliers	kilograms	1,000.0
Millimicrons	meters	1 X 10 ⁻⁹
Milligrams	grains	0.01543236
milligrams	grams	0.001
milligrams/liter	parts/million	1.0
millihenries	henries	0.001
milliliters	liters	0.001
millimeters	centimeters	0.1
millimeters	feet	3.281 X 10 ⁻³
millimeters	inches	0.03937
millimeters	kilometers	10 ⁻⁶
millimeters	meters	0.001
millimeters	miles	6.214 X 10 ⁻⁷
millimeters	mils	39.37
millimeters	yards	1.094 X 10 ⁻³
million gals/day	cu ft/sec	1.54723
mils	centimeters	2.540 X 10 ⁻³
mils	feet	8.333 X 10 ⁻⁵
mils	inches	0.001
mils	kilometers	2.540 X 10 ⁻⁸
mils	yards	2.778 X 10 ⁻⁵
miner's inches	cu ft/min	1.5
Minims (British)	cubic cm.	0.059192
Minims (U.S., fluid)	cubic cm.	0.061612
minutes (angles)	degrees	0.01667
minutes (angles)	quadrants	1.852 X 10 ⁻⁴
minutes (angles)	radians	2.909 X 10 ⁻⁴
minutes (angles)	seconds	60.0
myriagrams	kilograms	10.0
myriameters	kilometers	10.0
myriawatts	kilowatts	10.0
N		
nepers	decibels	8.686
Newton	Dynes	1 X 10 ⁵
O		
OHM (International)	OHM (absolute)	1.0005
ohms	megohms	10 ⁻⁶
ohms	microhms	10 ⁶
ounces	drams	16.0
ounces	grains	437.5
ounces	grams	28.349527
ounces	pounds	0.0625
ounces	ounces (troy)	0.9115
ounces	tons (long)	2.790 X 10 ⁻⁵
ounces	tons (metric)	2.835 X 10 ⁻⁵

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY
O (Cont)		
ounces (fluid)	cu inches	1.805
ounces (fluid)	liters	0.02957
ounces (troy)	grains	480.0
ounces (troy)	grams	31.103481
ounces (troy)	ounces (avdp)	1.09714
ounces (troy)	pennyweights (troy)	20.0
ounces (troy)	pounds (troy)	0.08333
Ounce/sq. inch	Dynes/sq cm	0.4309
ounces/sq in.	pounds/sq in.	0.0625
P		
Parsec	Miles	19 X 10 ¹²
Parsec	Kilometers	3.084 X 10 ¹³
part-/million	grains/U.S. gal	0.0584
parts/million	grains/lmp. gal	0.07016
parts/million	pounds/million gal	8.345
Pecks (British)	cubic inches	554.6
Pecks (British)	liters	9.091901
Pecks (U.S.)	bushels	0.25
Pecks (U.S.)	cubic inches	37.605
Pecks (U.S.)	liters	8.809582
Pecks (U.S.)	quarts (dry)	8
pennyweights (troy)	grains	24.0
pennyweights (troy)	ounces (troy)	0.05
pennyweights (troy)	grams	1.55517
pennyweights (troy)	pounds (troy)	4.1667 X 10 ⁻³
pints (dry)	cu inches	33.60
pints (liq.)	cu cms.	473.2
pints (liq.)	cu feet	0.01671
pints (liq.)	cu inches	28.87
pints (liq.)	cu meters	4.732 X 10 ⁻⁴
pints (liq.)	cu yards	6.189 X 10 ⁻⁴
pints (liq.)	gallons	0.125
pints (liq.)	liters	0.4732
pints (liq.)	quarts (liq.)	0.5
Planck's quantum	Erg second	6.624 X 10 ⁻²⁷
Poise	Gram/cm. sec.	1.00
Pounds (avoirdupois)	ounces (troy)	14.5833
poundals	dynes	13,826.0
poundals	grams	14.10
poundals	joules/cm	1.383 X 10 ⁻³
poundals	joules/meter (newtons)	0.1383
poundals	kilograms	0.01410
poundals	pounds	0.03108
pounds	drams	256.0
pounds	dynes	44.4823 X 10 ⁴
pounds	grains	7,000.0
pounds	grams	453.5924
pounds	joules/cm	0.04448
pounds	joules/meter (newtons)	4.448
pounds	kilograms	0.4536
pounds	ounces	16.0
pounds	ounces (troy)	14.5833
pounds	poundals	32.17
pounds	pounds (troy)	1.21528
pounds	tons (short)	0.0005
pounds (troy)	grains	5,760.0
P (Cont)		
pounds (troy)	grams	373.24177
pounds (troy)	ounces (avdp.)	13.1657
pounds (troy)	pennyweights (troy)	240.0
pounds (troy)	pounds (avdp.)	0.822857
pounds (troy)	tons (long)	3.6735 X 10 ⁻⁴
pounds (troy)	tons (metric)	3.7324 X 10 ⁻⁴
pounds (troy)	tons (short)	4.1143 X 10 ⁻⁴
pounds of water	cu feet	0.01602
pounds of water	cu inches	27.68
pounds of water/min	cu ft/sec	2.670 X 10 ⁻⁴
pound-feet	cm-dynes	1.356 X 10 ⁷
pound-feet	cm-grams	13,825.0
pound-feet	meter-kgs	0.1383
pounds/cu ft	grams/cu cm	0.01602
pounds/cu ft	kgs/cu meter	16.02
pounds/cu ft	pounds/cu in.	5.787 X 10 ⁻⁴
pounds/cu ft	pounds/mil-loot	5.456 X 10 ⁻⁹
pounds/cu in.	gms/cu cm	27.68
pounds/cu in.	kgs/cu meter	2.768 X 10 ⁴
pounds/cu in.	pounds/cu ft	1,728.0
pounds/cu in.	pounds/mil-foot	9.425 X 10 ⁻⁶
pounds/ft	kgs-meter	1.488
pounds/in.	gms/cm	178.6
pounds/mil-foot	gms/cu cm	2.306 X 10 ⁶
pounds/sq ft	atmospheres	4.725 X 10 ⁻⁴
pounds/sq ft	feet of water	0.01602
pounds/sq ft	inches of mercury	0.01414
pounds/sq ft	kgs/sq meter	4.882
pounds/sq ft	pounds/sq in.	6.944 X 10 ⁻³
pounds/sq. in.	atmospheres	0.06804
pounds/sq in.	feet of water	2.307
pounds/sq in.	inches of mercury	2.036
pounds/sq in.	kgs/sq meter	703.1
pounds/sq in.	pounds/sq ft	144.0
Q		
quadrants (angle)	degrees	90.0
quadrants (angle)	minutes	5,400.0
quadrants (angle)	radians	1.571
quadrants (angle)	seconds	3.24 X 10 ⁵
quarts (dry)	cu inches	67.20
quarts (liq.)	cu cms	946.4
quarts (liq.)	cu feet	0.03342
quarts (liq.)	cu inches	57.75
quarts (liq.)	cu meters	9.464 X 10 ⁻⁴
quarts (liq.)	cu yards	1.238 X 10 ⁻³
quarts (liq.)	gallons	0.25
quarts (liq.)	liters	0.9463
R		
radians	degrees	57.30
radians	minutes	3,438.0
radians	quadrants	0.6366
radians	seconds	2.063 X 10 ⁵
radians/sec	degrees/sec	57.30
radians/sec	revolutions/min	9.549

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
R (Cont)			S (Cont)		
radians/sec	revolutions/sec	0.1592	square kilometers	sq meters	10 ⁶
radians/sec/sec	revs/min/min	573.0	square kilometers	sq miles	0.3861
radians/sec/sec	revs/min/sec	9.549	square kilometers	sq yards	1.196 X 10 ⁶
radians/sec/sec	revs/sec/sec	0.1592	square meters	acres	2.471 X 10 ⁻⁴
revolutions	degrees	360.0	square meters	sq cms	10 ⁴
revolutions	quadrants	4.0	square meters	sq feet	10.76
revolutions	radians	6.283	square meters	sq inches	1,550.0
revolutions/min	degrees/sec	6.0	square meters	sq miles	3.861 X 10 ⁻⁷
revolutions/min	radians/sec	0.1047	square meters	sq millimeters	10 ⁶
revolutions/min	revs/sec	0.01667	square meters	sq yards	1.196
revolutions/mini/min	radians/sec/sec	1.745 X 10 ⁻³	square miles	acres	640.0
revolutions/min/min	revs/min/sec	0.01667	square miles	sq feet	27.88 X 10 ⁶
revolutions/min/min	revs/sec/sec	2.778 X 10 ⁻⁴	square miles	sq kms	2.590
revolutions/sec	degrees/sec	360.0	square miles	sq meters	2.590 X 10 ⁶
revolutions/sec	radians/sec	6.283	square miles	sq yards	3.098 X 10 ⁶
revolutions/sec	revs/min	60.0	square millimeters	circular mils	1,973.0
revolutions/sec/sec	radians/sec/sec	6.283	square millimeters	sq cms	0.01
revolutions/sec/sec	revs/min/min	3,600.0	square millimeters	sq feet	1.076 X 10 ⁻⁵
revolutions/sec/sec	revs/min/sec	60.0	square millimeters	sq inches	1.550 X 10 ⁻³
Rod	Chain (Gunters)	0.25	square mils	circular mils	1.273
Rod	Meters	5.029	square mils	sq cms	6.452 X 10 ⁶
Rods (Surveyors' meas.)	yards	5.5	square mils	sq inches	10 ⁻⁶
rods	feet	16.5	square yards	acres	2.066 X 10 ⁻⁴
S			square yards	sq cms	8,361.0
Scruples	grains	20	square yards	sq feet	9.0
seconds (angle)	degrees	2.778 X 10 ⁻⁴	square yards	sq inches	1,296.0
seconds (angle)	minutes	0.01667	square yards	sq meters	0.8361
seconds (angle)	quadrants	3.087 X 10 ⁻⁶	square yards	sq miles	3.228 X 10 ⁻⁷
seconds (angle)	radians	4.848 X 10 ⁻⁶	square yards	sq millimeters	8,361 X 10 ⁵
Slug	Kilogram	14.59	T		
Slug	Pounds	32.17	temperature	absolute	1.0
Sphere	Steradians	12.57	(°C) +273	temperature (°C)	
square centimeters	circular mils	1.973 X 10 ⁵	temperature	temperature (°F)	1.8
square centimeters	sq feet	1.076 X 10 ⁻³	(°C) +17.78		
square centimeters	sq inches	0.1550	temperature	absolute	1.0
square centimeters	sq meters	0.0001	(°F) +460	temperature (°F)	
square centimeters	sq miles	3.861 X 10 ⁻¹¹	temperature	temperature (°C)	5/9
square centimeters	sq millimeters	100.0	(°F)32		
square centimeters	sq yards	1.196 X 10 ⁻⁴	tons (long)	kilograms	1,016.0
square feet	acres	2.296 X 10 ⁻⁵	tons (long)	pounds	2,240.0
square feet	sq cms	929.0	tons (long)	tons (short)	1.120
square feet	sq inches	144.0	tons (metric)	kilograms	1,000.0
square feet	sq meters	0.09290	tons (metric)	pounds	2,205.0
square feet	sq miles	3.587 X 10 ⁻⁶	tons (short)	kilograms	907.1848
square feet	sq millimeters	9.290 X 10 ⁴	tons (short)	ounces	32,000.0
square feet	sq yards	0.1111	tons (short)	ounces (troy)	29,166.66
square inches	circular mils	1.273 X 10 ⁶	tons (short)	pounds	2,000.0
square inches	sq cms	6.452	tons (short)	pounds (troy)	2,430.56
square inches	sq feet	6.944 X 10 ⁻³	tons (short)	tons (long)	0.89287
square inches	sq millimeters	645.2	tons (short)	tons (metric)	0.9078
square inches	sq mils	10 6	tons (short)/sq ft	kgs/sq meter	9,765.0
square inches	sq yards	7.716 X 10 ⁻⁴	tons (short)/sq ft	pounds/sq in.	2,000.0
square kilometers	acres	247.1	tons of water/24 hrs	pounds of water/hr	83.333
square kilometers	sq cms	10 10	tons of water/24 hrs	gallons/min	0.16643
square kilometers	sq ft	10.76 X 10 ⁶	tons of water/24 hrs	cu ft/hr	1.3349
square kilometers	sq inches	1.550 X 10 ⁹			

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
V			W (Cont)		
Volt/inch	Volt/cm.	0.39370	watt-hours	kilogram-meters	367.2
Volt (absolute)	Statvolts	0.003336	watt-hours	kilowatt-hrs	0.001
W			Watt (International)	Watt (absolute)	1.0002
watts	Btu/hr	3.4129	webers	maxwells	10^8
watts	Btu/min	0.05688	webers	kilolines	10^5
Watts	ergs/sec	107.0	webers/sq in.	gausses	1.550×10^7
watts	foot-lbs/min	44.27	webers/sq in.	lines/sq in.	10^8
watts	foot-lbs/sec	0.7378	webers/sq in.	webers/sq cm	0.1550
watts	horsepower	1.341×10^{-3}	webers/sq meter	webers/sq meter	1,550.0
watts	horsepower (metric)	1.360×10^{-3}	webers/sq meter	gausses	10^4
watts	kg-calories/min	0.01433	webers/sq meter	lines/sq in.	6.452×10^4
watts	kilowatts	0.001	webers/sq meter	webers/sq cm	10^{-4}
Watts (Abs.)	B.T.U. (mean)/min.	0.056884	webers/sq meter	webers/sq in.	6.452×10^{-4}
Watts (Abs.)	joules/sec.	1	Y		
watt-hours	Btu	3.413	yards	centimeters	91.44
watt-hours	ergs	3.60×10^{10}	yards	kilometers	9.144×10^{-4}
watt-hours	foot-pounds	2,656.0	yards	meters	0.9144×10^{-4}
watt-hours	gram-calories	859.85	yards	miles (naut.)	4.934×10^{-4}
watt-hours	horsepower-hrs	1.341×10^{-3}	yards	miles (stat.)	5.682×10^{-4}
watt-hours	kilogram-calories	0.8605	yards	millimeters	914.4

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APPENDIX C

Appendix C lists the part name, part number and NIIN number of equipment, materials or supplies used in this manual and which are not listed in any IPB. This appendix lists the part name in alphabetical order.

Item Number	Part Number	NIIN Number
Abrasive Mat	MIL-A-9962	00-967-5093
Adhesive, Polyurethane	UR-1092	LH-000-1650
Battery, Manganese Dioxide	849AS103 (FW14)	01-334-0724
Brush, Disposable	A-A-289/H-B-643	00-514-2417
Cap, Snap Fastener	M527981-1B	00-276-4954
Cap, Uni-Directional Snap Fastener	MS27983-1	00-891-9073
Cement, Polychloroprene	MIL-A-5540	00-142-9913
Cloth, Aramid, Green	MIL-C-83429	01-147-2064
Cloth, Lint Free	MIL-C-85043	00-044-9281
Cloth, Nylon, Polychloroprene-Coated, Sage Green	MIL-C-19002	00-935-1759
Cloth, Nylon, Polychloroprene-Coated, Yellow	MIL-C-19002	00-935-6427
Cloth, Nylon, Polychloroprene-Coated, Orange	MIL-C-19002	00-060-9136
Cloth, Nylon, Polyurethane-Coated, Typ 1	MIL-C-83489	01-335-3129
Cord, Nylon, Typ 3	MIL-C-5040	00-240-2146
Cord, Nylon, Typ 1	MIL-C-5040	00-240-2154
Cord, Packaging	1138-003-01	01-066-3357
Compound, Corrosion Prevention	MIL-C-85054	01-041-1596
Compound, Silicone	G624	00-880-7616
D-Ring	MA51925-2	00-202-0228
Detergent, General Purpose	MIL-D-16791	00-282-9699
Distress Signal, MK-124, MOD 0	—	01-030-8330
Gage, Dial, Push/Pull	DPPH50	00-473-0108
Die, Cylinder Thread Chaser	1842-008-01	01-069-4040
Duck, Cloth, Nylon	MIL-C-7219	00-765-2863
FLU-8B/P, Automatic Inflator	849AS150	01-092-3087

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Item Number	Part Number	NIIN Number
Grommet, Brass	MS20230B20	00-291-0302
Handle, Beaded Inflation	975AS121-11	01-120-4752
Ink, Marking Black	SPE-92	00-161-4229
Ink, Yellow Drawing	A-A-59291	00-634-6583
Isopropyl Alcohol	TT-I-735A	00-286-5435
Kit, Gasket	105AS100-5	00-498-6964
Kit, Gasket	105AS100-6	00-113-8920
Lubricant, Silicone	DC7	00-975-0712
MEK (Methyl Ethyl Ketone)	TT-M-261	00-281-2762
Multimeter, Digital	8600A	01-010-0088
Nitrogen, Water-Pumped	BB-N-411	86 STOCK#’S
O-Ring (Seat Seal Gaskets)	MS28775-012	00-584-0265 00-005-0426
Pencil, Solder	W-S-570	00-204-3855
Post, Snap Fastener	MS27981-5B	00-250-6858
Post, Uni-Directional Snap Fastener	MS27983-4	00-276-4978
Pouch, Dye Marker	68A73D2-41	01-124-3806
Pouch, Flare	68A73D3-61	01-123-2194
Punch, Cutting, 3/16"	3GGG-P-833	00-180-0941
Rivet, Post	MS27986-3B	00-281-4359
Rivet, Cap	MS27986-4B	00-281-2553
Roller, Wooden	GGG-R-00620	00-243-9401
RTV Silicone	DC4	00-843-0802
Scale, Gram	A-A-52021-1	00-514-4117
Screw, Retaining, Piercing Pin	1842-006-01	01-069-6535
Sensor, Plug Cap	1618-012-01 (FW97)	01-092-3088
Snaphook CWBC1	MIL-S-43770/1	01-187-9402
Socket, Snap Fastener	M527981-3B	00-276-4966
Socket, Uni-Directional Snap Fastener	MS27983-2	00-945-2577
Stud, Uni-Directional Snap Fastener	MS27983-3	00-276-4908
Stud, Snap Fastener	MS27981-4B	00-901-9660
Talc, Technical	MIL-T-50036A	01-080-9589
Tape, Hook, Typ I, 1/2" Wide, Sage Green	MIL-F-21840	00-405-2266
Tape, Hook, Typ I, 1/2" Wide, Green	MIL-F-21840	00-425-1294
Tape, Pile, Typ II, 1" Wide, Sage Green	MIL-F-21840	00-405-2263

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Item Number	Part Number	NIIN Number
Tape, Pile, Typ II, 1-1/2" Wide, Green	MIL-F-21840	00-425-2264
Thread, Nylon, Size A, Typ I	V-T-295	00-204-3803
Thread, Nylon, Size E, Typ II	V-T-295	00-204-3884
Thread, Nylon, Size E, High Temp, Green	MIL-T-83193	00-405-2252
Tool, Valve Core	8769A	01-354-5423
Toluene	TT-T-548	00-281-2002
Pump, Rotary Vacuum	61E44688	00-052-5015
Valve, Inflator, Typ II	MIL-L-25370	00-561-0094
Webbing, Nylon, 3/4"	MIL-W-4088	00-782-3224
Webbing, Nylon, 1", Typ IV	MIL-T-5038	00-261-8579
Webbing, Nylon Tape, 3/4" Wide, Typ II	MIL-T-5038	00-176-8083
Webbing, Nylon Tape, 1" Wide, Green	MIL-T-5038	00-753-6144

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GLOSSARY

ACB. Abbreviation for Aircrew Systems Bulletin. An ACB is a technical publication issued by NAVAIR which directs a one-time inspection of aircrew life support equipment and contains related instructions. Technical directive code 67 has been assigned to identify ACBs.

ACC. Abbreviation for Aircrew Systems Change. An ACC is a technical publication issued by NAVAIR which directs and provides for, the accomplishment of a change, modification, repositioning or alteration of aircrew life support equipment in service. Technical Directive code 66 has been assigned to identify ACCs.

ACCESSORY. Item attached to a liferaft to improve its effectiveness but not essential to the main function of a raft. For example, a sea anchor and a retaining line are accessories.

ACCESSORY CONTAINER LINE. A 10-foot, 1/8-inch diameter length of nylon cord (MIL-C-5040 Type III) used to secure accessory container to liferaft.

APPROX. Abbreviation for approximately.

AUTOMATIC INFLATOR. An automatic inflation device (FLU-8/P Series) installed on life preservers. The inflator body is constructed with a small explosive charge (squib) and batteries. When the inflator is immersed in water an electrical circuit is completed and fires the squib. The gases from the squib in turn force the piercing pin forward puncturing the CO₂ cylinder which inflates the life preserver.


BACKSTITCH. A stitch made by inserting the needle a stitch length behind and bringing it up a stitch length ahead of the last stitch. Also, sewing back over a row of stitches.

BAG, BALLAST. An open pouch located on under side of one man raft to allow stabilization when boarding.

BARTACK. A concentrated series of zig-zag-like stitches used to reinforce points of stress. A bartack shall have 28 stitches per half-inch (per MIL-O-81900AS).

BEADED INFLATION HANDLE. A handle with beaded grip, attached to inflation assemblies, designed to significantly increase accessibility and to provide a multidirectional pull capability.

BOXSTITCH. A rectangular stitch used to attach and reinforce.

. Symbol for centerline.

CAGE. Commercial and Government Entity (CAGE) is a five position alpha-numeric code. CAGE codes are assigned to organizations (entities) that are manufacturers or maintain design control of items of supply procured and cataloged by agencies of the Federal government, Cataloging Handbook H4/H8.

CALENDAR INSPECTION. A detailed searching inspection for material degradation that may have occurred during the preceding calendar interval and provide an opportunity to perform essential preventative maintenance. The inspections are programmed in multiple calendar weeks.

CAUTION. Indicates danger to the equipment. The caution precedes the step or item to which it refers.

CDI. Collateral Duty Inspector. A person whose qualified IAW OPNAV 4790.2 Series and function is to inspect critical steps in maintenance of a piece of equipment.

COMPONENT. An item of equipment making up part of an assembly or subassembly.

CONFIGURATION. The makeup, size, shape and relative location of parts of an item of equipment and its accessories. This includes the composition of materials as well as marking details. The configuration of each equipment is specified by government drawings, military specifications and the modification instructions contained in this volume.

D-RING. A metal fitting shaped in the form of the letter "D", for example, a D-ring on a harness connects to a chest type parachute assembly by means of snap fittings. Also, a slang term for the ripcord handle.

DEBURR. To remove minor irregularities on the surface of machined metals by grinding or filing.

DIA. Abbreviation for diameter.

DOFF. To remove or take off an item of clothing or equipment.

DON. To put on an item of clothing or equipment.

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DROPPABLE. A hand launched liferaft assembly.

EQUALIZER TUBE. A small corrugated tube which connects the main upper and lower tubes of the twenty-man liferaft. The equalizer tube allows even distribution of CO₂ to each main tube during inflation. After inflation a clamp should be attached to prevent leakage from one tube to another should one tube develop a leak.

EXTERNAL/WING COMPARTMENT. A compartment for stowing liferafts. Access to the compartment is located on the outside of the fuselage or wing.

EYELET. A small metal reinforcement for a hole in cloth, similar to a grommet, except thinner and smaller, and having no washer. The eyelet is used to reinforce lacing holes in small covers, etc.

FABRICATE. To make up or construct an item of equipment, accessory or material.

FAKE. To fold a line or lanyard in a back and forth fashion.

FLOTATION CELL. The inflatable compartments of a life preserver.

FUNCTIONAL TEST. A test which puts an item to use to determine if it operates correctly.

FUSELAGE INSTALLED LIFERAFT. Refers to liferafts stowed within the passenger/cargo compartment of the aircraft.

GROMMET. A metal eye and washer used to reinforce a hole in material, for example, grommets on container side flaps.

GROSS WEIGHT. The gross weight of a carbon dioxide cylinder includes the weight of the cylinder, the weight of the carbon dioxide contained by the cylinder, and the weight of the inflation valve attached to the cylinder.

GUSSET. A triangular insert, as in a garment for strengthening or enlarging.

HEAVING LINE. A line with a rubber donut attached to one end for casting to survivors during rescue operations.

HEM. A border of cloth article doubled back and stitched down; also, to finish a hem.

HOOK TAPE. See [TAPE](#), [HOOK](#).

HSSP. High Speed Soft Pack.

HYDROSTATIC PRESSURE. Pressure or force per unit area exerted by a motionless liquid against the surface of a container.

HYDROSTATICS. A branch of physics that deals with the characteristics of liquids at rest and with the pressure in a liquid or exerted by a liquid on an immersed body.

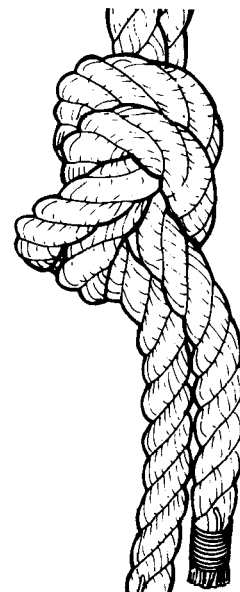
HYDROSTATIC TEST. This is a permanent volumetric expansion of multiplace liferaft CO₂ cylinders. This test is conducted hydrostatically every five years at 5/3 the working pressure of the tested cylinder.

IAW. In Accordance With.

IN. Abbreviation for inches.

INFLATION ASSEMBLY. Inflation valve and carbon dioxide cylinder or cartridge assembled as a unit.

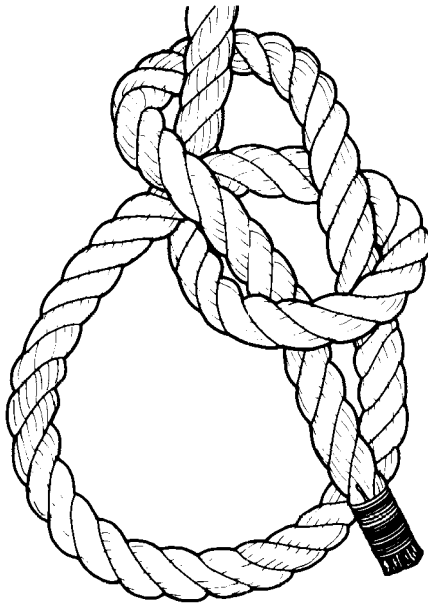
KNOT, BINDER. The simplest method of joining two threads or lines. The two ends are placed side by side and a simple, overhand knot is then tied in both lines simultaneously. It will not slip when drawn tightly. Also called a thumb knot.



Binder Knot

ZZ000002

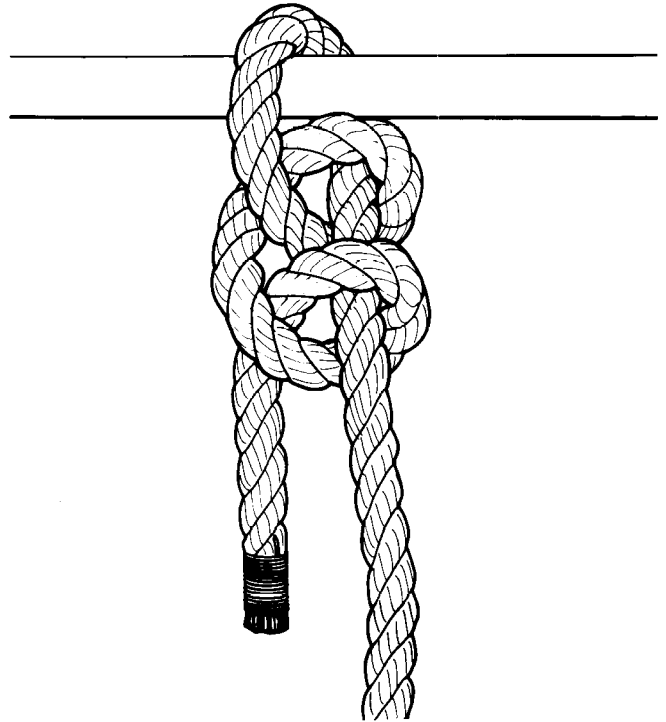
KNOT, BOWLINE. A knot formed by making a small overhand loop a desired distance from the end of the line. The end of the line is then passed through the loop from the underside of the main part of the line and back through the small part of the loop. When this knot is drawn tight, it will not slip but still can be easily untied.



Bowline Knot

ZZ000003

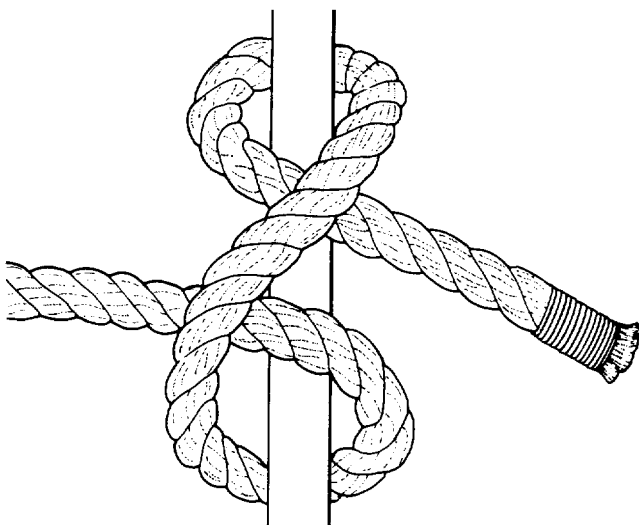
KNOT, HALF-HITCH. A knot formed by passing a cord or line around an object, then passing the free end around the main part of the cord and bringing the free end up through the loop thus formed. It is used in forming safety ties.



Half-Hitch Knot

ZZ000005

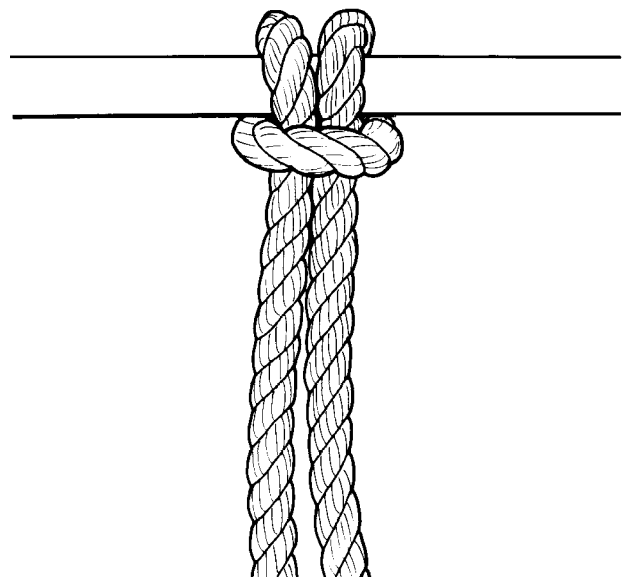
KNOT, CLOVE-HITCH. A knot formed by making one turn around a post, bringing the end across the line, continuing around the post a second time and passing the end under the second loop.



Clove-Hitch Knot

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KNOT, LARK'S HEAD. A knot formed around an attachment ring or bar by passing the free ends of the line around the bar or through the ring and then through a loop or bight in the line.

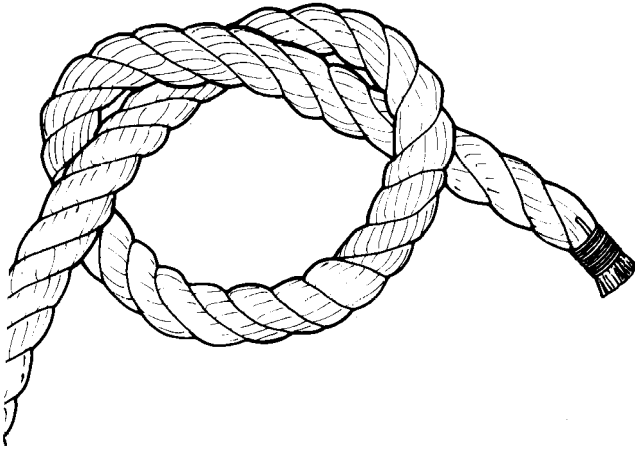


Lark's Head Knot

ZZ000006

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KNOT, OVERHAND. A simple knot tied in the end of a line by forming a loop and passing the end over and down through the loop.



Overhand Knot

ZZ000007

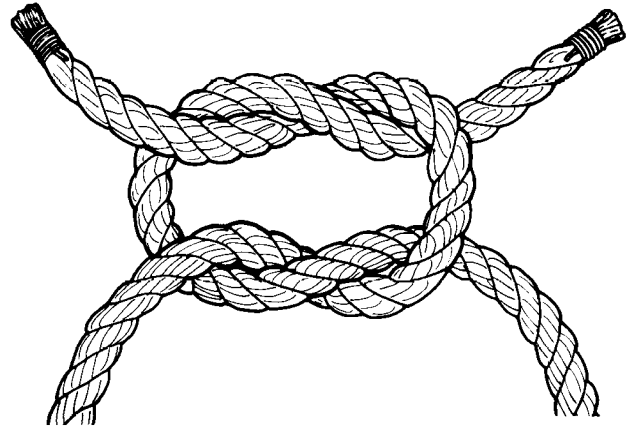
KNOT OVERHAND LOOP. Double the line forming a loop; then tie a simple overhand knot forming as large a loop as desired.



Overhand Loop Knot

ZZ000008

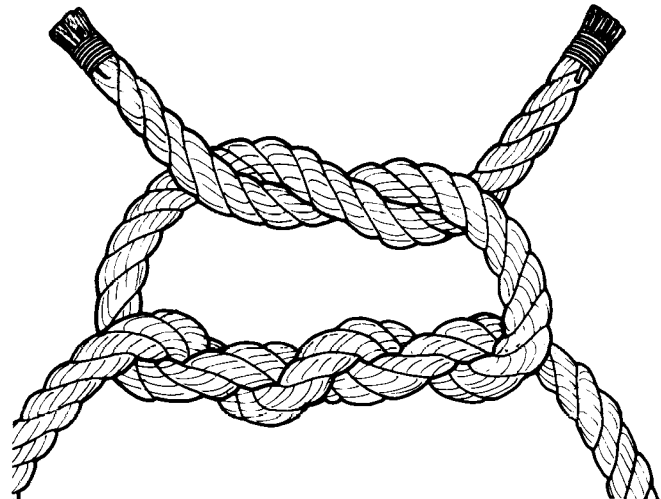
KNOT, SQUARE. A knot formed by passing the end of the cord in the left hand over and under the end in the right hand and then reversing the process by passing the end in the right hand over and under the end in the left hand.



Square Knot

ZZ000009

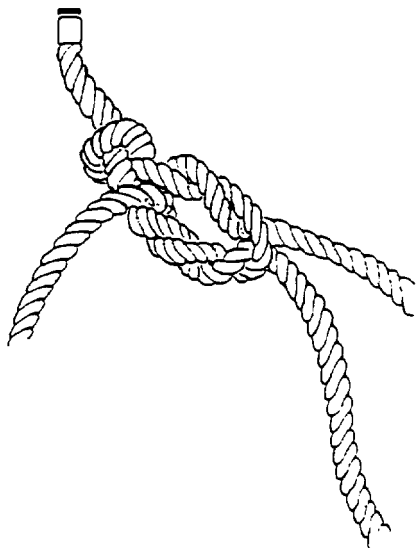
KNOT, SURGEON'S. The surgeon's knot is similar to the square knot, except that the first overhand tie is wrapped twice around the cord or line.



Surgeon's Knot

ZZ000010

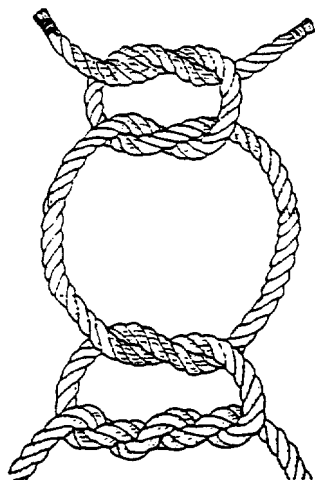
KNOT, SURGEON'S/KNOT, OVERHAND. A combination of two standard knots formed exactly as the name suggests. Form surgeon's knot near end of line then follow with overhand knot in end of line positioned snugly against surgeon's knot to ensure no slippage.



Surgeon's Knot/Overhand Knot

ZZ000011

KNOT, SURGEON'S/KNOT, SQUARE. A combination of two standard knots formed exactly as the name suggests. Form the surgeon's knot first, then form a complete and separate square knot snugly against surgeon's knot.



Surgeon's Knot/Square Knot

ZZ000012

LBS. Abbreviation for pounds.

LIFE LINE. A length of 3/4-inch circumference 1500 pound test nylon rope (MIL-R-17343 NIIN 00-618-0261) routed around the gunwale of raft and tied to each patch loop. It is used as a hand hold during rough seas.

LIFE PRESERVER. Basic life preserver without inflation assemblies and survival items.

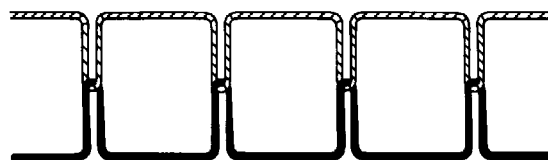
LIFE PRESERVER ASSEMBLY. Life preserver with inflation assembly.

LIFE RAFT. Basic liferaft with accessories attached, but without an inflation assembly, survival items, or cases and containers.

LIFE RAFT ASSEMBLY. Liferaft with inflation assembly.

LOBE. An inflation section of a life preserver.

LOCKSTITCH. A common sewing machine stitch formed when the thread in the needle goes through the material and connects with the bobbin thread. The needle and bobbin thread should lock in the center of the material thickness. (Ref. ASTM-D-6193, Type 301).



Lockstitch

ZZ000013

LOCKWIRE. A wire that prevents loosening of a securing device.

MIM. Abbreviation for Maintenance Instruction Manual. MIM manuals are NAVAIR 01 series manuals containing maintenance instructions for specific types of aircraft.

MOORING LINE. A line used to hold fast a vessel or aircraft.

MULTIPLACE LIFERAFT. A liferaft capable of accommodating more than one person.

NA. Not Applicable.

NADC. Naval Air Development Center.

NATOPS. Naval Air Training and Operating Procedures Standardization.

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NATRA. Naval Air Training Command.

NATSF. Naval Air Technical Services Facility.

NAVAIR. Naval Air Systems Command, Headquarters.

NAVAIRSYSCOM. Naval Air Systems Command.

NFO. Naval Flight Officer.

NIIN. National Item Identification Number.

NOTE. An information item. A note may precede or follow the item or step to which it refers.

ORAL INFLATION ASSEMBLY. Oral inflation valve and tube assembled as a unit.

PACKAGED LIFERAFT ASSEMBLY. Liferaft assembled, packed and ready for use. Packaged liferaft assembly includes liferaft, inflation assembly, accessories, survival items, and one or more containers, all enclosed in an outer container or carrying case.

PAINTER, COTTON CORD. A 60-foot length of cotton cord (T-C-571, Type I, Size 4, NIIN 00-233-6555 or 00-270-5468) with a 50 to 150 pound static breaking strength. The painter line retains deployed liferafts to the aircraft during emergency egress but will easily break if the aircraft sinks.

PERIODIC MAINTENANCE REQUIREMENTS MANUAL (PMRM). Provides general and specific instructions to perform scheduled maintenance at the organizational and intermediate levels. These requirements are performed at specific intervals that are normally based upon calendar time, flight hours, operating hours, or other events that affect equipment performance. The PMRM consists of Maintenance Requirement Cards (MRC's)

PHASED INSPECTION. A division of the total scheduled maintenance requirements into small packages (phases) of approximately the same work content, that are accomplished sequentially at specific intervals.

PILE TAPE. See [TAPE](#), [PILE](#)

PMS. Planned Maintenance System.

PREFLIGHT INSPECTION. An inspection conducted prior to each flight to ensure the equipment is safe for use and to verify proper servicing.

PSIG. Abbreviation for pounds per square inch as measured with a device calibrated to discount the pressure of the earth's atmosphere.

PURGE. To remove undesirable particles or substances from a container by the high velocity injection of a gas or liquid, usually in short bursts.

QUALIFIED PERSONNEL. Graduates of the Navy Aircrew Survival Equipmentman School.

R. Abbreviation for radius.

REF. Abbreviation for reference.

REMOTE INFLATION. That assembly which uses cables and lanyards to actuate the inflation valve.

RETAINING LINE. A length of 1-inch nylon webbing (MIL-T-5038, Type III; NIIN 00-176-8085). The loop end is attached to the liferaft inflation valve and the snaphook end is attached to the aircrewman. It is used to secure liferaft to aircrewman and to provide a rapid means of locating inflation valve.

REEVE. To pass a rope or webbing through a loop, grommet or other opening of a component, often in a prescribed direction or manner.

RIGHT. To restore to an upright position.

RIGHTING LINE. A length of 1/4-inch diameter 1500 pound test nylon rope (MIL-R-17343; NIIN 00-618-0261) used to right an overturned liferaft. It is tied to the liferaft lifeline opposite carbon dioxide cylinder.

SAFETY TIE. Low strength thread which serves to inhibit accidental opening, discharge or separation.

SAR. Search and Rescue.

SCRAP. To discard items, parts or materials which are obsolete or no longer usable.

SDLM. Standard Depot Level Maintenance. Provides for a comprehensive inspection of selected aircraft structures and materials, critical defect correction, preventative maintenance as required, modification and technical directive compliance to insure reliability and operational availability of the aircraft at minimum cost for the established operating service period, and to provide intermediate support during the total service life.

SEA ANCHOR. A drag, usually a nylon-covered conical frame, floating behind a vessel to prevent drifting or to maintain a heading into the wind.

SEAR. To melt and fuse the ends or edges of material, such as nylon cord or webbing, with heat.

SM&R CODES. Source, Maintenance and Recoverability Codes.

SPECIAL INSPECTION. A scheduled inspection with a prescribed interval other than daily, calendar, phased or Standard Depot Level Maintenance (SDLM).

STOWING. The act of putting away in a neat, orderly fashion.

SUPPLY LINE. A 5-foot length of Type III nylon cord (MIL-C-5040; NIIN 00-240-2146) which secures the raft supply and bailer pockets to liferaft.

SURVIVAL ITEM. An item used to protect or sustain life, or to provide a means of signaling for help, for example, food packets and survival radios are survival items.

TAPE, HOOK. Strip of nylon tape with small nylon hooks on one side. Hook tape is used together with pile tape as a fastener.

TAPE, PILE. Strip of nylon tape with small nylon loops on one side. Used with hook tape as a fastener.

TARE WEIGHT. The weight of an empty container; for example, the tare weight of a carbon dioxide cylinder includes the weight of the empty cylinder and the weight of the inflation valve.

TURNAROUND INSPECTION. This inspection is conducted between usage to ensure the integrity, verify proper servicing, and to detect degradation that may have occurred during previous use.

TYP. Abbreviation for typical.

WARNING. Indicates danger to personnel. A warning precedes the item or step to which it refers.

WHIPSTITCH. A stitch used to join two pieces of webbing and to reinforce weak seams.

X. Abbreviation for times or by.

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